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SIGILLVM · VNIVERSITATIS · CALIFORNIENSIS
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EDUCATION DEPT.

1. Sphacele [White Sage] Labiali.
2. Antirrhinum (Snap dragon)
3. Euphacelia Bicolor (yellow nemophola.)
4. Dicentra Chrysantha (yellow).
5. Hypericum Concinnum (St Johns wort) Hypericacea
6. Silene Californica (Scarlet pink) Cary.
7. Eucharidium Concinnum
8. Calochortus Venustus Lillia
9. Chemiso
10. Yerba Santa.
11. Adenophyllum (Linacaea) Yellow fine.
12. Allium Sinatum (pink onion) Lilli.
13. Brodiaea Lilliaceae
    - a. Hookera Coronaria (Single Blue
    - b. Triteleia Hyacinthia - White
    - c. " Sessa - 15-30. Blue
14. Limnanthes Alba - somewhat like White nemophola.
15. Collinsia Scrofulariaceae
    - a. Corymbosa ? Much branched stems
    - b. Greenei not " "
16.
17. Orthocarpus
    - a. erianthus (deep yellow
18 Pentstemon
    - a. heterophyllus

19. Heliotropium = Boraginaceae

A POPULAR
CALIFORNIA FLORA,

OR,

MANUAL OF BOTANY FOR BEGINNERS.

WITH

ILLUSTRATED INTRODUCTORY LESSONS, ESPECIALLY ADAPTED TO THE PACIFIC COAST.

TO WHICH IS ADDED AN

ANALYTICAL KEY TO WEST COAST BOTANY.

CONTAINING BRIEF DESCRIPTIONS OF OVER 1600 SPECIES OF PACIFIC COAST PLANTS.

By VOLNEY RATTAN,
Teacher of Natural Sciences in the Girls' High School,
San Francisco.

Eighth Revised Edition.

SAN FRANCISCO:
THE BANCROFT COMPANY,
1888.

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PREFACE.

THE first edition of this book was prepared for the press during the evenings and Saturdays of the month of January, 1879. The hope that an abler hand would undertake the task deferred the beginning, and the needs of a class of over five hundred pupils hastened the completion of a work that would have been more slowly elaborated had the reputation of the author been the only consideration. The errors incident to such rapid work were as far as possible corrected the following year, in a second edition, which was prefaced as follows:

> "I have endeavored to prepare an inexpensive manual which will enable beginners in botany to determine the names of all plants with conspicuous flowers that may be found growing wild in the Central Valley of California from Visalia to Marysville, and through the Coast Ranges from Monterey to Ukiah. Over six hundred species of plants are characterized by descriptions condensed, for the most part, from Vol. I of the 'California Botany,' and Sereno Watson's 'Revision of the North American Liliaceæ.' Valuable material has also been obtained from a 'Revision of the Eriogoneæ,' by Torrey & Gray, Gray's 'Synoptical Flora of North America,' and 'Gray's Manual of Botany.'
>
> "Plants belonging to the Parsnip, Aster, Willow, Oak, and Pine Families, are not described, being mostly too difficult for beginners, or of little interest to them. The Introductory Lessons are designed to show the learner how to study the growth of plants, as well as to give such knowledge of their structure as will enable him to understand the descriptions in the Flora. The 'Glossary of Generic and Specific Names' will enable the student to make appropriate common names for most plants.
>
> "To the authors whose works have furnished the materials for this book is due the credit for whatever of excellence it may possess; to the compiler, who may, in a few cases, have misrepresented these authors, attaches the blame for most of its defects.
>
> "I am indebted for suggestions and criticisms to Prof. E. W. Hilgard, Dr. C. L. Anderson, Prof. W. H. Brewer and Dr. Asa Gray. To the latter I am especially grateful for his kind interest in my humble work."

One third of the second edition was new matter, and only about half of the book in its present form is printed from the stereotype plates of the first edition. The newer half of the work, although necessarily partaking somewhat of the nature of patchwork, is as good as I can make it. My drawings upon wood have been faithfully engraved, and, though claiming no artistic merit, will, I trust, prove helpful to the learner. With few exceptions—always noted in the text—the plants, or parts of plants, are represented of the natural size. Besides the more obvious improvements, an entirely new Analytical Key replaces the old one; and our most common oaks are described.

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Assuming that facts in natural history are useless if merely memorized from the book, and that the student must earn his knowledge by observing and experimenting, it is obviously best to encourage him at first by showing him how to try simple experiments whose results are easily interpreted. Seeds are the best material for such experiments, since the phenomena connected with their germination are not only easily observed, but deeply interesting. For this reason what may seem a disproportionate space in the Introductory Lessons is devoted to "The Beginnings of Plant Life." There are no lessons of greater educational value than those given to observing eyes by the growth of a plant from the first quickening of the dry embryo to the putting forth of flowers and the ripening of fruit. A sunny window in each school-room should be devoted to these beautiful object lessons of nature. It must not be forgotten, however, that since most young people are eager to learn the names of plants whose flowers they admire, it is best to devote most of the spring months to the study of Systematic Botany. The child's "What is it?" and the finger pointing to the plant in bloom, show plainly with what to begin the study of botany. Baron Frederick von Mueller says in his preface to an elementary work upon the botany of Victoria, Australia: "An experience of nearly forty years has convinced the author that the use of a grammar-like publication for initiating into a study of plants is alike wearisome to teacher and children, and that as a rule, subject to rare exceptions, the knowledge acquired from the ordinary first elementary works on botany is as quickly lost as gained. The only method of rendering such studies agreeable and lastingly fruitful consists in arousing an interest of the young scholars in the native plants of their locality, to afford them all possible facilities to recognize and discriminate all the various plants within reach, to lead them by observations thus started to comprehend the limits of specific forms, of generic and ordinal groups, and to conduct them afterwards to the more difficult study of special anatomy and physiology of plants."

Teachers and learners are here reminded of the importance of carefully writing out the details of experiments tried, as well as descriptions of what has been observed. In the words of Dr. Asa Gray: "The naturalist must not only observe that he may describe, but describe if he would observe."

It will be noticed—and the fact has formed the basis of a criticism—that the descriptions of genera and species in this Flora are very brief; as a rule only the contrasting characteristics being given, since more is calculated to confuse rather than help the beginner. Dr. Gray says: "In floras, as in more general works, abridged descriptions or diagnoses suffice—indeed, are preferable in all cases where the region is pretty well explored, and where materials can be thoroughly elaborated."

Although the Flora is designed especially for students in Central California, it will be found only a little less useful to those studying as far south as Los Angeles, or as far north as the Columbia. The Introductory Lessons are suited to the entire Pacific Coast.

SAN FRANCISCO, January, 1882. V. R.

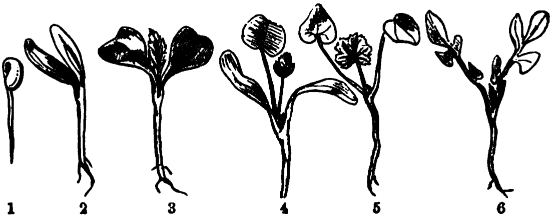
INTRODUCTORY LESSONS

IN

STRUCTURAL BOTANY.

SECTION 1.—THE BEGINNINGS OF PLANT LIFE.

1. If the first rain of the wet season is followed by warm, sunny weather, specks of green will soon appear among the dry stems of last year's weeds; and in fence corners or other eddy nooks where summer winds have drifted seeds and covered them with dust, you may find perfect mats of baby plants. With a shovel skim off a few square inches of this plant-bearing soil, and carefully examine it. Except a few green needles, which you recognize as spears of grass, most of these little plants seem to consist of white stems, which split at the top into pairs of green leaves. Looking sharply, you may find between each pair of leaves a tiny bud; or, in the older plants, this may have grown other leaves, which curiously enough are not like the first two. (Figures 1 to 6). Searching through the shovelful of earth you will likely find plants in all stages of growth, from swollen and sprouting seeds to stems, which are just pushing their bowed leaf-heads into the sunlight. Here, then, is material from which you may learn how plants grow; a lesson, remember, which no text-book or schoolmaster can teach you. It will be easier, however, since most of these early wild plants come from very small seeds, to take



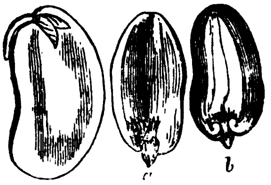
1. Seed of Bur-clover just before it appears above ground. **2.** Same three days older. **3.** Mustard. **4.** Bur-clover showing the first and second plumule leaves; the former simple (apparently), the latter with three leaflets. **5.** Mallows (Malva borealis), showing the long-petioled seed leaves (Cotyledons), and one plumule leaf unfolded. **6.** Filaria (Erodium), with lobed or sub-compound seed leaves.

your first lessons from plants which have larger beginnings. You should first study—

2. **The Plant in the seed.** Get many kinds of large seeds, such as peas, beans, squash-seeds, buckeyes, castor beans, corn, etc. Put them in water that they may become soft enough to be readily separated into their parts. In a day or two starchy seeds, such as peas or beans, will be in good condition.

3. First take a bean and make drawings showing the outlines as seen sidewise and edgewise. Any marks that seem to be found on all beans must be put down in the drawing, but do not bother about the shading. These attempts to represent what you see will lead to the discovery of certain marks on the concave edge of the bean, the meaning of which you may sometime learn by studying the growth of the seed in the pod. After you have thus studied the outside of the seed, slit it along the back with a sharp knife and take out the kernel. It readily splits into halves which are held together near one end by a short stem. Upon breaking them apart the stem sticks to one half, and you discover growing from the inner end a pair of tiny embracing-leaves. Make another drawing and compare it with Fig. 7. Presently it will be clear to you that this entire kernel is a little plant. The plant in this dry apparently lifeless first stage of its existence is called—

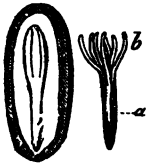
4. **The Embryo, or Germ.** This, as you have seen, is made up of the stem, or *Radicle;* the thick parts called *Cotyledons,* and the two-leaved bud, or *Plumule.* The embryo of a pea is similar to that of a bean, but the plumule is more decidedly a bud. Fig. 8 represents the straight embryo of a peanut. The radicle is not bent around against the cotyledons as in the pea and bean, and the plumule shows two divided leaflets. The cotyledons of the squash are thin and the plumule is scarcely visible. Lupine, though its seeds resemble beans, has a long radicle and a minute plumule. The buckeye seems to have a long radicle, but since it splits nearly to its point, where you will find a large plumule, it is evident that the apparent radicle is mostly made up of the cotyledon stems (petioles).



7 8

7. One cotyledon of a bean with the radicle and large plumule. **8.** Embryo of a peanut. *a,* inner side of one cotyledon with the radicle and plumule; *b,* outer side of the same.

5. **Albuminous Seeds.** Remove the shell-like coat of a castor bean, and carefully split it flatwise. What at first seems to be a large plumule proves to be free from the rest of the kernel, and with care you may be able to get it out whole (Fig. 10.) It is a straight embryo with beautifully veined, leaf-like cotyledons, embedded in a white, oily substance, which makes up the mass of the kernel. This substance is called *Albumen*, a name which applies to anything inclosed with the embryo by the seed coats. Peas, beans, acorns, nuts, and most large seeds have no albumen. Carefully cut thin slices from a well soaked coffee grain until its embryo appears as represented in Fig. 12. The horny, folded albumen makes up most of the seed. A similar, but smaller embryo, may be found in the brain-shaped, fleshy albumen of the ivy seed. The embryo of the Tree-Datura, or Stramonium, is shown in Fig. 11. It has slender cotyledons, folded down against a thick radicle, the whole embedded in tough, fleshy albumen. Take the embryo of a Morning-Glory seed and pick the bits of transparent, jelly-like albumen out of the pockets in the crumpled cotyledons. An attempt to flatten out the cotyledons will probably result in something like *b*, Fig. 13, which may lead you to suppose that the cotyledons are separately crumpled, which is not the case. They stick closely together by their inner faces, as do the cotyledons of other seeds you have examined, and they are crumpled as one; but, being notched at the end, they readily split down the center. Buckwheat seeds will give you some trouble. Indeed, it will



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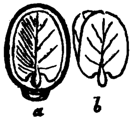

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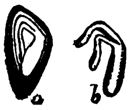

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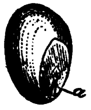

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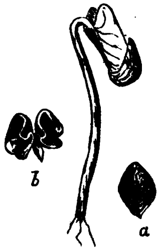
9. Seed of Willow or Digger Pine cut so as to show the straight embryo in the center of the oily albumen. *a* and *b*, embryo taken out, the cotyledons (*b*) separated. **10.** Seed of the Castor-bean. *a*, the broad thin embryo nearly dividing the albumen; *b*, the embryo removed and the leaf-like cotyledons separated. **11.** Seed of Datura (Brugmansia), showing at *a* the bent embryo in the scanty albumen; *b*, the embryo taken out and the slender cotyledons separated. **12.** A grain of coffee. *a*, the straight embryo.



13. Morning-Glory just appearing above the ground with the seed coat sticking to the cotyledons. *a*, the swollen seed; *b*, embryo, with the crumpled cotyledons split down the middle in the attempt to flatten them.

be much easier to make out the exact shapes and positions of the embryos in most albuminous seeds after they have begun to grow.

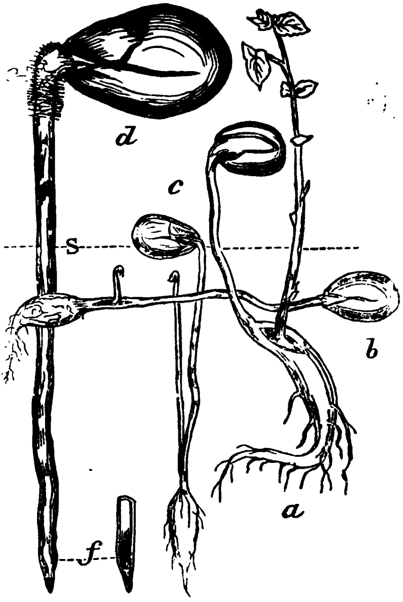
Monocotyledonous Embryos. Corn, wheat, oats, and possibly a few other seeds in your collection, are different in plan from any yet described. In corn the soft portion called the chit is the embryo. Wheat and oats have smaller but similar embryos. You cannot easily distinguish the parts of these embryos, but you can, at least, determine that they have *not two* cotyledons. Really they have *one* cotyledon, and are therefore said to be *Monocotyledonous.* When you study the growing seeds you will see how widely they differ from seeds which have—

Dicotyledonous Embryos. These are embryos, which, like the bean, have two cotyledons. A few plants belonging to the *Pine Family* have

Polycotyledonous Embryos. Fig. 12 shows the embryo of the common Willow or Digger Pine, which has more than two cotyledons in a whorl at the top of the radicle.

The Germination of Seeds. Plant the remainder of your seeds—those of a kind together—in boxes or pots of sand, or any kind of loose soil you can get. Keep this little experimental garden in a warm place, where it can get a bit of sunshine, and water it daily. At intervals of three or four days dig up one of each kind of seed, and, after careful examination, make drawings to illustrate the successive stages of growth. It is of the greatest importance that you repeatedly attempt to draw what you see; it is of the least importance that your drawings are pretty.

You will learn, among many interesting facts, that most seeds are pushed up to the surface of the ground by the growth of the radicle. There the seed-coats drop off (except that in seeds without albumen the cotyledons are apt to slip out of their coats on the way up); the cotyledons spread apart, become longer and broader, and turn green; lastly, the plumule becomes a leafy stem. Meanwhile, roots grow from the lower end of the radicle. Some cotyledons, like those of the pea, do not appear above ground, but send the plumule up. The seeds of Big-root—a pest which grows in nearly every field—behave in a remarkable manner. The nut-like seeds drop from their prickly pods in June or July, and soon become covered with leaves. The rains of November and December cause them to sprout, as represented at *d.* The mimic radicle—really a



tube formed by the united petioles, or stems, of the thick cotyledons, and only tipped by the radicle—penetrates the ground to a depth, usually, of four or five inches. The plumule meanwhile, as shown in *f*, remains dormant in the bottom of the tubular sprout. When the petiole growth ceases, the radicle grows rapidly by absorbing the nourishment stored in the cotyledons, and becomes a tuber. Meanwhile the plumule begins its upward growth, splitting the petioles apart, and usually escaping from between them, as shown in the figure below *c*. In this wonderful way the plumule bud is deeply planted together with nourishment (stored in the radicle) which, if necessary, can be used to aid its first growth. The reason for this curious behavior is obvious, when we know that ground squirrels are fond of these seeds, and that a severe frost will kill the young plant. If the seeds wait till warm weather to sprout, hungry rodents may find them; if they germinate early, and in the manner of other seeds, Jack Frost may nip them.*

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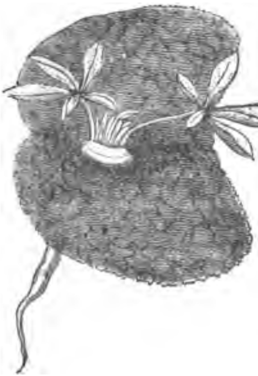
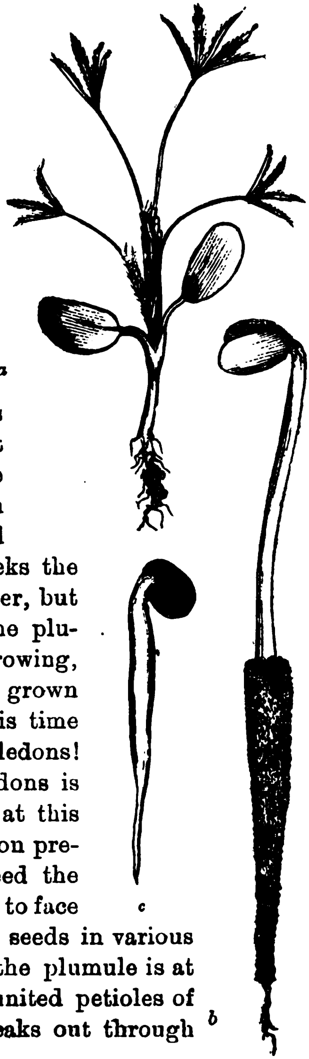
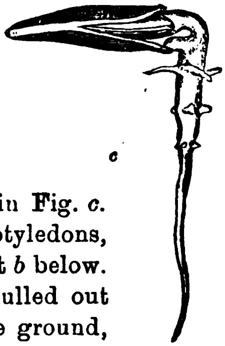
* Dr. Asa Gray, who first experimented with these seeds, found them to grow as represented at *a*, in the figure [reduced one fourth from Fig. 43, Botanical Text-book, edition of 1879]. Evidently on account of some obstruction, probably the bottom of a small pot, the seeds were elevated two or three inches above the surface of the soil [the dotted line S represents the surface of the ground for figures *a*, *b*, and *c*]. My experiments with seeds planted in shallow boxes gave very different results—shown at *b*, which is a reduced copy of Fig. 14 of second edition. The plants came up about four inches from where the seeds were planted, the plumule being pushed laterally that distance by the elongation of the cotyledon petioles. Such inexplicable behavior stimulated to further observation, which resulted in the discovery that naturally planted seeds, unhampered by boxes or pots, usually grow as represented at *c* and *d*. In one instance a sprout measured seven inches from the plumule to the cotyledons! The hairs at *e* probably help the sprout to penetrate the soil, by fastening on to the surface crust. Curiously enough, growing sprouts underground frequently avoid obstacles without touching them.

a. Lupinus micranthus; the first plumule leaf on the left. **b.** Lupinus arboreus, as it appears when grown in sand; the root-hairs are ladened with sand. **c.** Lupinus densiflorus. **d.** The same, after the cotyledons are fully developed, and the plumule has appeared.

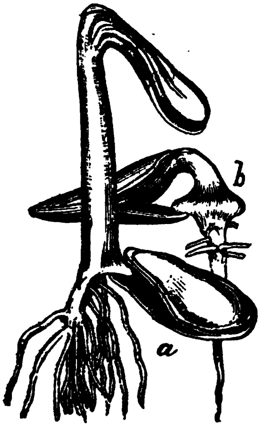




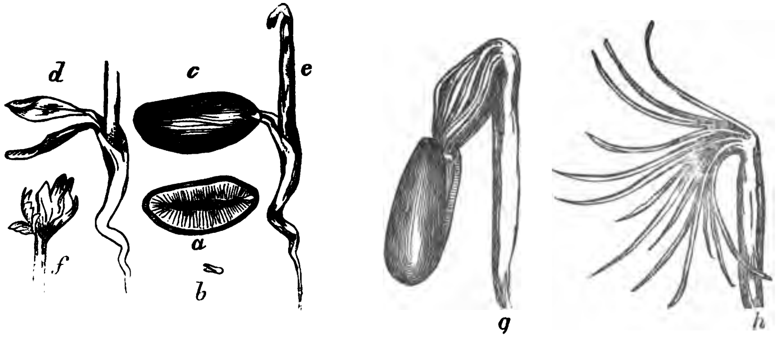
Lupines ordinarily grow as represented in the cut at *a*, but a common white-flowered kind presents at the end of a month's growth the queer appearance shown at *d*. At first the sprouting seeds appear to be like those of other lupines (see Fig. *c*), but when the cotyledons open, they are seen to be united by their broad bases. For two or three weeks the cotyledons enlarge; not only becoming broader, but thicker; yet we look in vain for a trace of the plumule. Meanwhile a white pustule has been growing, which finally bursts and discloses the partly grown leaves of the missing bud, which has all this time been hidden in the thick stem below the cotyledons! Now, the tough leathery skin of these cotyledons is proof against the nightly frosts that prevail at this season of the year (December), so they go on preparing food from the air with which to feed the tender plumule, until it also is strong enough to face Jack Frost. If you carefully examine these seeds in various stages of their growth, you will learn that the plumule is at the bottom of a short tube formed by the united petioles of the cotyledons. Sometimes the plumule breaks out through the side of this tube below the cotyledons, instead of bursting through between them.



Do not fail to see for yourself how squash embryos pry open their tough coats. Soon after the sprout has gained a foothold in the soil, a little knob grows on the side of the radicle so as to split more widely open the point of the seed coat, as shown in Fig. *c*. Then the radicle stem between the knob and the cotyledons, by growing, pries the seed still wider open, as seen at *b* below. Finally, by continued growth, the cotyledons are pulled out of the seed coat and upward to the surface of the ground, where they expand, and become pretty good leaves. Seeds planted edgewise, which of course could rarely happen in nature, can not thus free themselves of their seed coats, and it has been proved by a French botanist (M. Flahault) that seeds which come up with their coats on do not thrive. The seed at *b* in the figure was first planted the other side up. It was turned over when the knob on the right had begun to open the seed. The radicle, which then pointed directly upward, gradually straightened, bent downward, and finally the second knob grew, by the help of which the seed leaves were in a fair way to get out when the drawing was made. Some native California plants get out of their coats in a similar manner.



Germination of Albuminous Seeds. You have observed that when seeds without albumen send their cotyledons above ground, the seed coats are usually left behind, but the albuminous seeds named in paragraph 5 retain their seed coats often for several days after they come up. Examine the coats after they are thrown off, and you will find none of the albumen which formed the larger part of their contents before germination. The enlarged cotyledons tell what has become of it, and it *is* now plain why the coats were retained.

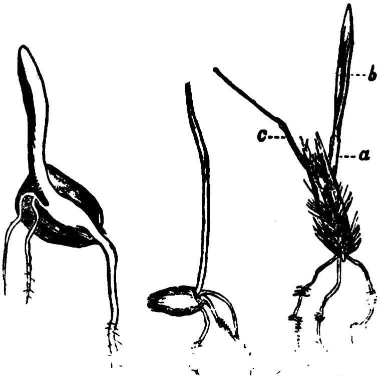


a. **Section of a seed of Pæonia Brownii, showing the small embryo at the right in the copious albumen.** *b*. The embryo removed and the cotyledons separated. *c*. The germinating seed. *d*. The same, with the seed coats removed to show the leaf-like cotyledons. *e*. Plumule bud, or real end of the upward-growing stem. *f*. The first plumule leaf as it appears above ground, the terminal bud yet dormant under ground. *g*. Seed of Pinus Sabiniana (Digger, Willow, or Nut Pine) soon after it appears above ground. *h*. Same, with the seed coats removed to show the 14 cotyledons. See Fig. 9, p. vii.

You must have wondered why the cotyledons of a bean, which never become leaf-like, should appear above ground. It is equally strange that the albuminous seeds of the peony should behave in the reverse way. As shown in the cut (*a* and *b*), the embryo is very small. In germination the plumule comes up while the cotyledons become decidedly leaf-like, and fill the shell which has been emptied of its albumen to feed them and the plumule. These thin, veiny seed leaves could certainly do better work above ground than those of most lupines, yet they never come up. There is another curious thing about the growth of peony seeds, which you may try to discover.

When the buckwheat and cotton seeds have begun to sprout, you can study their embryos. Note how the thin, broad cotyledons of the former are folded once and rolled up with a layer of snow-white starch; and how the speckled seed leaves of the latter are folded along the center, then outwardly back, and finally crumpled endwise to make them fit coats too short for them. Maple seeds have curiously crumpled and folded cotyledons. Indeed, all seeds have interesting lessons to teach us.

Germination of Monocotyledonous Seeds. The seeds named in paragraph 6 do not clearly show their embryos in germination, but they are readily enough distinguished from dicotyledons. The downward growing sprouts are several instead of one, and the upward growing sprout is like a rolled grass leaf (Figs. 15 to 17). By tasting of the growing seeds you can discover what the starchy albumen is changed to before it is fit food for the young plant. It must be remembered that only the grass-like monoctyledons grow as here represented. If possible, get Lily seeds, Iris seeds, etc.



15. Germinating corn. 16. Wheat. 17. Wild-Oats; *a*, colorless sheath inclosing the first plumule-leaf *b*; *c*, the twisted and bent beard by means of which it is able to travel to cracks in the ground and thus plant itself.

If you examine seeds and study their growth as you have been directed, you will have the evidence of your own eyes that an embryo is a plant in a sort of sleeping state from which it may be aroused to activity by moisture and warmth. It will be evident that the radicle is a stem; that the cotyledons correspond to leaves, and that the plumule is a bud from which is to grow all the above-ground portion of the plant. Remember, that if these, or any other statements concerning the structure and behavior of plants, are not confirmed by your own judgment upon what you have yourself observed, they are useless to you, except as guides pointing to what you are to find. To memorize these statements of facts is to secure the husks, not the kernels, of knowledge. Plants themselves must teach you how they grow. The book can only show you how to question them and how to interpret their answers. Do not fail to carefully compare the results of all your experiments; for in this way you can decide what are general or usual facts, and what are exceptional. The latter should be closely investigated, since it is probable that there is a reason for all unusual as well as usual behavior of plants.

SECTION 2.—THE STRUCTURE OF PLANTS.

Stems. While awaiting the development of germs in your experimental garden, you can study plants which have already reached maturity in wild gardens. Go out and dig up the first plant—not too large—that you find in blossom. I will suppose that you have found the very common Filaria (also called Pin-clover; and children call the curious seeds with twisted tails, clocks). Its parts are *Roots*, *Stem*, *Leaves*, and *Flowers*. (Some time, if you continue studying Botany, it will be proved to you that flowers are forms of stems, or stem-branches.)

Crush the stem. It is made up of stringy fibers and a soft substance filled with juice. The former is generally called *Fibrous Tissue* or *Wood;* the latter, *Cellular Tissue*. The lower part of the stem and the upper part of the root—the older portions of the plant—contain more wood than the branches and the rootlets, while the leaves have only net-like skeletons of wood. It would be interesting to study these tissues with the aid of a microscope, and thus become acquainted with the innermost structure of plants; but for the present it will be sufficient if you can distinguish, in a general way, wood from cellular tissue.

Cut the stem squarely across near the upper end, and from one piece take a thin slice. Stick this on a pin and hold it up to the light. It is nearly transparent, except a green ring of skin outside and a ring of white dots inside. The latter are cut ends of woody fibers which run lengthwise of the stem. Make a similar section of the lower part of the stem and you will find a continuous ring in place of the dots, showing that in the older part the fibers have become so numerous as to form a hollow cylinder of wood. The inclosed cellular tissue is called the *Pith*.

Exogens and Endogens. If the stem lives year after year there will be added successive layers of wood outside of the first one. Such stems are woody, and if they grow many years become *Bushes, Shrubs, or Trees*. Plants that grow in this way are called *Exogens*. Examine Asparagus, Soap-root, Iris, or any Lily and you will find the wood fibers scattered irregularly through the stems. These plants are *Endogens*. All our native

trees and most other plants are exogens. **Palm-trees, Century-plants, grasses**, and the "small grains," are endogens.

Herbs are plants whose stems die, at least to the ground, after they have blossomed and matured fruit. These are *Annuals* when their lives are limited to one season; *Biennials* when they die the second year—not producing fruit the first year; *Perennials* when they live on year after year, their stems dying annually down to the ground. The underground portions of such stems are called—

Rootstocks. This name applies more particularly to such stems as grow nearly horizontally under ground, or become thick and fleshy with nutritious matter, which enables the plant to make rapid first growths each year. A rootstock can usually be distinguished from a true root by its bearing buds.

Bulbs are formed by a peculiar bud growth in which the leaves or their bases become very thick and fleshy, with a store of nourishment, while the stem grows in diameter, but scarcely at all in length.

Coated or Tunicated Bulbs are those in which the leaves form a succession of envelopes, as in the onion. If the leaves or leaf-bases are narrow, as in the lily, the bulb is *Scaly.*

Corms resemble bulbs, but are solid, and have more the nature of *Tubers*, which are the thickened ends of slender, branching, underground stems, as potatoes, ground artichokes, etc.

Leaves. Collect the leafy stems of many kinds of plants. Observe the arrangement of the leaves on the stems. A few like Erodium (Filaria), the Catchfly, Pink, Fuchsia, Mint, etc., have *Opposite* leaves. Possibly you may find a Collinsia, or stem of Cleavers, with the leaves in *Whorls* of three or more. Most plants have *Alternate* leaves. You will find some plants like Plantain, with a bunch of leaves growing from the ground, but no leafy stems. Such leaves come from rootstocks, and are said to be *Radical.* Plantain, Dodecatheon, Primrose, etc. have the leaves all radical. Many perennial herbs have radical leaves, as well as ordinary stem leaves, and these usually differ more or less from the stem leaves.

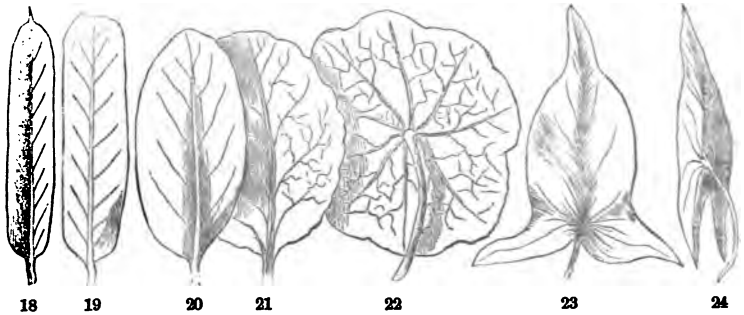
Observe that stems and branches end in buds or flowers, and that

there is usually a bud, or branch, or a flower at the base of a leaf between it and the stem from which it grows.

Buds and flowers at the ends of stems or branches, are *Terminal;* when between the stems and leaves, *Axillary.*

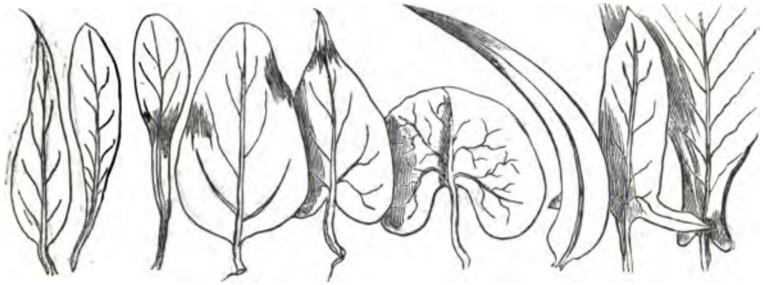
Examine the leaf of a Violet or Pansy. You can readily distinguish three parts: A broad *Blade;* a stem or *Petiole,* and a pair of appendages at the base of the petiole called *Stipules.* The latter in the Pansy are leaf-like. Sometimes they are mere scales, and frequently there are none at all. The petiole may be wanting, also; the leaf is then said to be *Sessile.* Leaves with but one blade are—

Simple Leaves. The illustrations (Figures 18 to 32) show the principal forms of simple leaves or leaflets of compound leaves. Carefully compare the blades of your leaves with these shapes. If the leaf in hand does not correspond with any of the figures, you may describe it by combining the descriptive words, or by adding a word. A leaf, for example, too broad to be lanceolate, and narrower than ovate, if about half way between the two forms, is *Ovate-lanceolate or Lance-ovate*; the first, if nearer ovate; the latter, if nearer lanceolate. Or, if merely a little broader than lanceolate, we may say it is *Broadly-lanceolate;* when more slender, *Narrowly-lanceolate;* if slender and nearly as broad in the middle as nearer the base, it is *Linear-lanceolate,* etc. So, too, there are intermediate forms described by such terms as: *Oblong-lanceolate; Narrowly-elliptical; Broadly-elliptical*—which approaches orbicular; *Broadly-cordate*—



Forms of Leaves.—18. Linear. 19. Oblong. 20. Elliptical. 21. Orbicular. 22. Peltate (Shield-shaped). 23. Hastate (Spear-shaped). 24. Sagittate (Arrow-shaped).

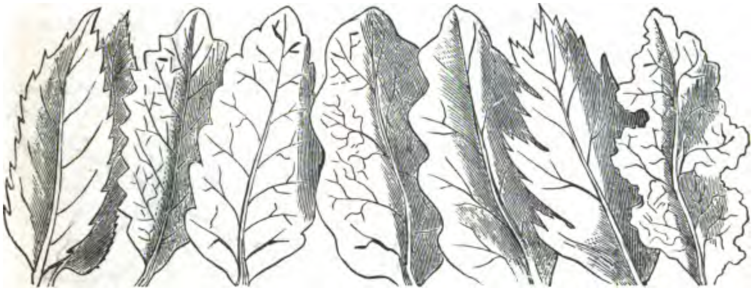
which becomes reniform if the apex, is rounded, etc. *Obovate; Oblanceolate; Obcordate*, etc., apply to forms the reverse of ovate, lanceolate, etc.



FORMS OF LEAVES.—**25.** Lanceolate. **26.** Oblanceolate. **27.** Spatulate. **28.** Ovate (Egg shaped). **29.** Cordate (Heart-shaped). **30.** Reniform (Kidney-shaped). **31.** Falcate (Sickle-shaped). **32.** Hastate (Spear-shaped). **32a.** Auriculate (Eared) base.

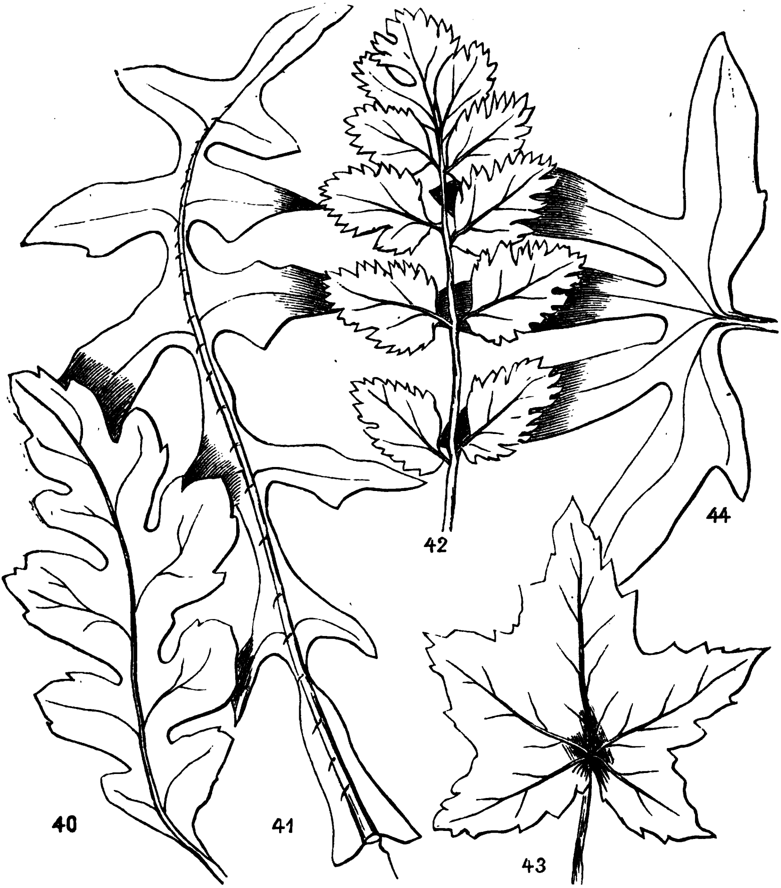
Apexes of Leaves. There are terms descriptive of the apexes (the upper ends) of leaves. Fig. 18 has a *Cuspidate* apex; Fig. 19, *Notched* or *Emarginate;* Figures 23, 24, 29, *Acute;* Fig. 25, *Acuminate;* Fig. 26, *Obtuse.*

Margins of Leaves. All these forms are represented as having entire or nearly entire margins, but the margins may be notched or cut in various ways. Figures 33 to 39 will assist you in describing the margins of your leaves. Here, also, you will find it necessary to combine ad-



LEAF MARGINS.—**33.** Serrate. **34.** Dentate. **35.** Crenate. **36.** Wavy. **37.** Sinuate. **38.** Incised. **39.** Erose.

jectives or use adverbs. Leaves may be *Finely-serrate* or *Coarsely-serrate*; and *Dentate*, *Crenate*, etc., may be similarly modified.

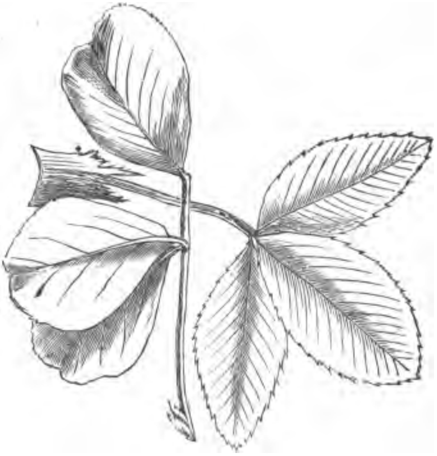


40. Pinnately lobed leaf, of White Oak (Quercus lobata). **41.** Pinnately parted leaf of Nemophila aurita (Lobes retrorse). **42.** Pinnate leaf of Erodium moschatum. **43.** Palmately lobed leaf of Maple. **44.** Palmately parted leaf of Viola lobata.

Lobed Leaves. These may be *Pinnately* or *Palmately* lobed, depending upon whether there is more than one rib proceeding from the base of the leaf. Fig. 40 represents a pinnately lobed leaf; Fig. 43, palmately lobed. When leaves are deeply lobed, as in Figures 41 and 44, they are said to be *Parted*. *Divided* leaves are cut quite to the midrib if pinnately divided, or to the end of the petiole when palmately divided. *Cleft* leaves have the sinuses between the lobes sharp as in Fig. 38. When leaves are pinnately cleft about half way to the midrib they are said to be *Pinnatifid*. If the lobes are pinnatifid it is described as *Bipinnatifid*. It is common to give the number of lobes in the descriptive phrase, as pinnately nine-lobed (Fig. 40); pinnately eleven-parted (Fig. 41); palmately five-lobed (Fig. 43); palmately five-parted (Fig. 44).

Compound Leaves have distinctly separate leaflets usually jointed to a common petiole, just as simple leaves are jointed to the stem. A leaf is *Pinnate*, when the leaflets grow along opposite sides of the petiole (Fig. 42); *Palmate*, if they all grow from the end of the petiole (Fig. 46). Fig. 45 represents a *pinnately 3-foliolate* leaf; Fig. 46, *palmately 3-foliolate*. When there is no odd leaflet at the end the leaf is *abruptly* pinnate. Leaves may be *twice*, *thrice*, etc., compound, that is, the leaflets may be compound as in some acacias.

Bracts are leaves among flowers, or small undeveloped leaves anywhere on the stem.



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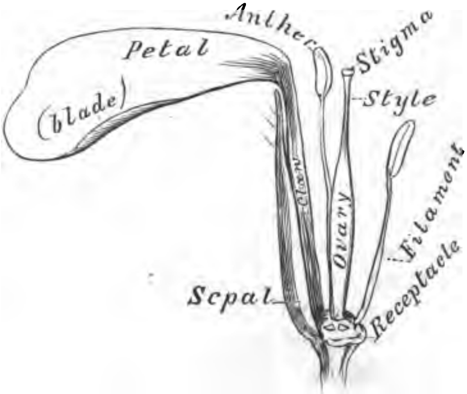
45. Pinnately 3-foliolate leaf of Bur-clover, with small stipules. **46.** Palmately or digitately 3-foliolate leaf of a true clover, the broad adnate stipules lacerate.

Stipules may be *adnate* to the base of the petiole, as in the rose and clover (Figures 45, 46); they may grow on the stem; or, as in some plants of the Buckwheat Family the stipules form a sheath surrounding the stem at the base of the petiole. Do not mistake the first leaves of a growing axillary bud for stipules.

Venation of Leaves. All the leaves thus far described are said to be *Netted-veined* or *Reticulated*, because their skeletons of wood fiber resemble nets. Examine the leaves of Iris, Calla, or any that are grass-like, and you will see why they are called *Parallel-veined.*

Netted-veined leaves grow on *Exogenous* stems. *Parallel-veined* leaves grow on *Endogenous* stems. The former belong to plants which grow from *Dicotyledonous* seeds; the latter to plants from *Monocotyledonous* seeds.

Flowers. Get a bunch of Mustard flowers—Wall-flowers, single Stock, or Radish flowers will do as well. Pluck a single blossom and note these facts: The most conspicuous part consists of four yellow leaves; outside of these are four smaller greenish yellow leaves in pairs not quite alike. The latter are *Sepals*, and together form the *Calyx;* the former are *Petals*, and together form the *Corolla.* Pull off the sepals, observing that they alternate with the petals. Next remove the petals. The broad part of each petal is called the *blade*, the narrow part, the *claw* (corresponding to the petiole of an ordinary leaf). Inside of the petals you find six yellow-headed bodies with white stems, two of which are shorter than the remaining four. These are the *Stamens.* Their stems are *Filaments;* the yellow heads are *Anthers*, and the yellow powder which they contain is *Pollen.* In the center of the flower is a club-shaped body called the *Pistil.* This is the young seed-pod, and by splitting it open you may see the minute *Ovules*, which are the beginnings of seed. The part containing the ovules is the *Ovary;* the naked upper end of the pistil is the *Stigma*, and the part connecting the stigma with the ovary is the *Style.* The end of the stem upon which the parts of the flower grow is the *Receptacle*, and the stem is called a *Peduncle.* Fig. 47 will assist you in learning these names.

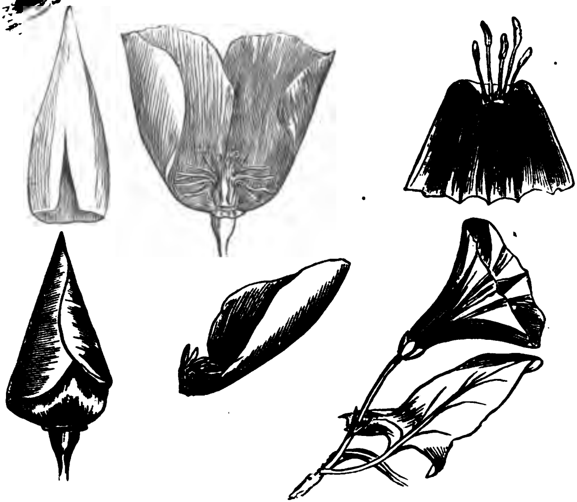


47. Magnified Mustard flower with four of the stamens, three petals and three sepals removed.

A Complete Flower must have calyx, corolla, stamens and pistils; but, since the office of a flower is to produce seeds, and these grow from ovules, which pollen has reached by way of the stigma, it follows that

A Perfect Flower may consist of pistils and stamens only, and of these the styles and filaments are not essential.

Cohesion of Floral Organs. When sepals cohere or grow fast to each other (Figs. 48–51) the calyx is *Gamosepalous*. So, also, the corolla may be *Gamopetalous*. When stamens cohere they are *Monadelphous* if in one set, *Diadelphous* if in two sets (usually 9 and 1), etc. Cohering pistils (carpels) form a *Compound Pistil*. The degrees of cohesion in calyx and corolla is described, as in leaves, by the terms *entire*, *cleft* or *lobed* and *parted*. Thus: Bindweed (Fig. 50) has an entire corolla limb; Zauschneria (Fig. 51) has a 4-lobed calyx; Nemophila has a 5-parted or deeply 5-lobed corolla, etc. If the flower has a limb (border) distinct from the tube, these terms apply to the limb.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48. Bud of Eschscholtzia, with the mitriform calyx removed and shown above. **49.** Open flower of the same, with two of the petals removed, one of these below with the stamens adhering to the claw. **50.** Flower and leaf of Convolvulus arvensis; above is the corolla split down, displaying five unequal stamens.

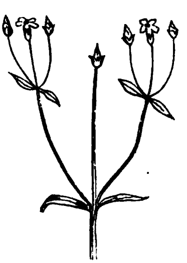
Adhesion of Floral Organs. The calyx may grow fast to the ovary (Fig. 51), then it is said to be *Superior* (ovary *inferior*). The corolla and stamens frequently grow on the calyx, as in Fuchsia, Strawberry, etc.; then they are said

51.

to be *Perigynous;* or the stamens may grow on the corolla (Fig. 50) as in most gamopetalous flowers, and in Eschscholtzia (Fig. 49). In the Orchis Family the stamens grow on the pistil.

Irregular Flowers are those in which parts of the same kind are unlike in form or size.

Inflorescence. The forms of flower-clusters are almost as various as the shapes of the flowers, but they may all be referred to two plans, viz.: *Terminal* and *Axillary.* The *Raceme* (Fig. 52) is a simple form of axillary inflorescence in which the leaves are reduced to bracts. If the flowers are sessile (without pedicels) the raceme becomes a *Spike* (Fig. 53). If the older flowers are raised on long pedicels the flat-topped cluster is called a *Corymb* (Fig. 55). In an *Umbel* the pedicels all grow from the end of the peduncle (Fig. 56). If these are very short or obsolete a *Head* is formed. A *Panicle* is a loose compound raceme. A *Thyrse* is a dense panicle. Fig. 54 represents a *Cyme,* the type of terminal inflorescence. A many-flowered cyme is a *Fascicle;* more densely flowered, a *Glomerule. Cymes* and *Fascicles* resemble *Corymbs;* but in the former, the central flowers are the older, while in the latter, the younger flowers or buds occupy the center. *Glomerules* differ from heads in the same way.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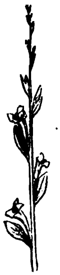
54. Cyme.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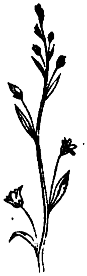
53. Spike.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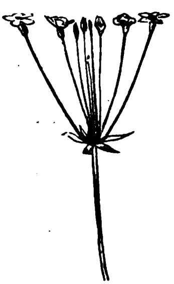
52. Raceme.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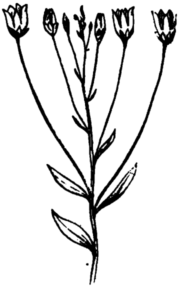
56. Umbel.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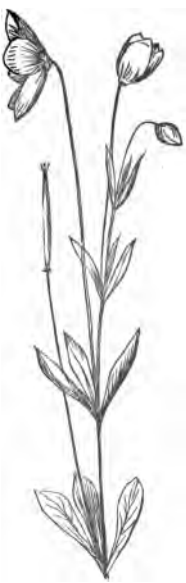
55. Corymb.

The woodland flowers Trillium and Anemone furnish examples of the simplest form of *Terminal Inflorescence.* Their simple stems bear each one flower at the top. Often flowers seem to be axillary when the plan of inflorescence is terminal. Fig. 57 illustrates a case of this kind.

Suppose that one of the branches in Fig. 54 had failed to grow. The first flower would then appear to be axillary. In the plant represented by Fig. 57, two of each set of three axillary buds usually remain dormant. Their growth would complete a *Trichotomous Cyme*. Fig. 54 represents a *Dichotomous Cyme*. Imagine the plant shown in Fig. 57 to continue branching, the stem to be shortened so as to bring the flowers close together, and the leaves to become obsolete. A bunch of flowers, having the appearance of a one-sided raceme, would be formed. Let the flowers become sessile, and we would have a false spike. Such mimic racemes and spikes are usually coiled as shown in Fig. 64.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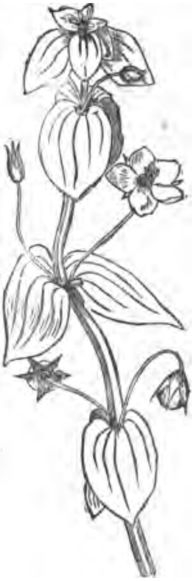
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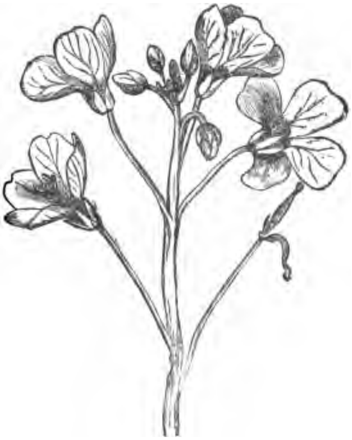
The common Anagallis, whose pretty salmon-colored flowers appear in the axils of the opposite leaves (Fig. 58), is an illustration of simple *Axillary Inflorescence*. Imagine the leaves reduced to bracts, and the stem shortened. The fruit, flowers, and buds would then form a *Bracteate Raceme*. Let the bracts become wanting, and we would have a naked or *Bractless Raceme*, similar to the one shown in Fig. 59. This raceme wants only a slight lengthening of the lower pedicels to become a *Corymb*. Indeed, it might be called a *Corymbose Raceme*. Fig. 60 represents a naked raceme, in which only one or two flowers are in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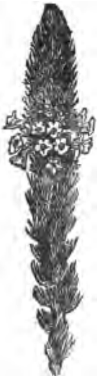

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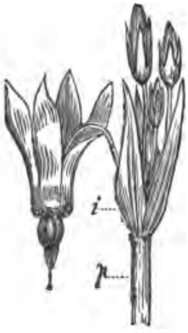

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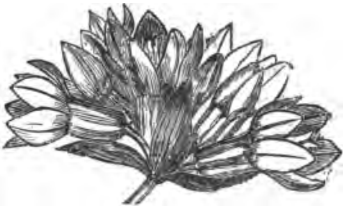

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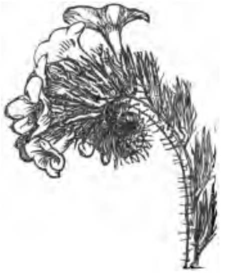

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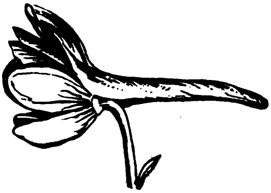
bloom at a time. A dense *Spike*, bearing a ring of flowers between growing ovaries below and expanding buds above, is shown in Fig. 61. The coiled spike (Fig. 64) is really a kind of cyme, as has been shown. This *Scorpioid Inflorescence* is characteristic of two families of plants, represented by many plants on this coast. Mosquito Bills (Fig. 62) grow in *Bracteate Umbels*. The *Head* or *Capitate* cluster (Fig. 63) is like an umbel, only the pedicels are mostly very short. When the flowers are numerous, the head becomes *Globose*. The true clovers have capitate flowers. When the pedicels in a raceme branch so as to bear two or more flowers each, a *Compound Raceme* is formed. So in like manner *Compound Umbels*, *Spikes*, and *Corymbs* may be formed. These flower bunches, cymes, racemes, etc., may be at the ends of main stems or branches, or in the axils of leaves, or replace single flowers in any kind of inflorescence.

The Calyx, as we have already learned, is composed of leaves called *Sepals*, which, though different from ordinary leaves in shape, are usually green. When the sepals are separate, the flower is *Polysepalous*. Sepals united partly or wholly form a *Gamosepalous* calyx. If the sepals drop off when the flower opens, as shown on p. 20a, they are *Caducous*. If they fall with the petals, or before the fruit is ripe, they are *Deciduous*. A *Persistent Calyx* remains until the fruit ripens (Fig. 65). A colored calyx—*i. e.*, not green—is said to be *Petaloid.* Flowers without petals and those of the Lily Family usually have petaloid sepals (Figs. 66, 70, 71).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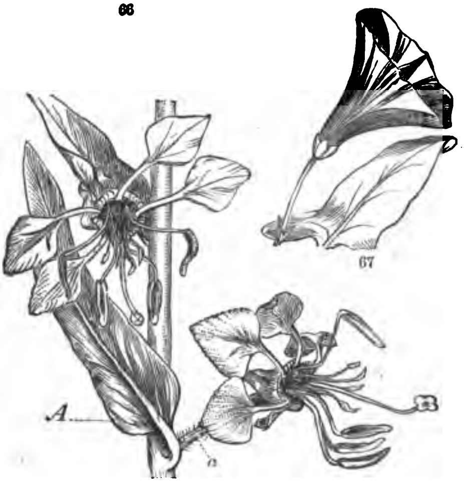

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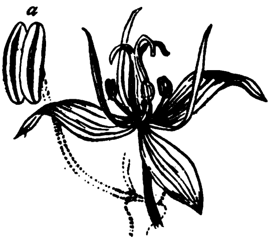

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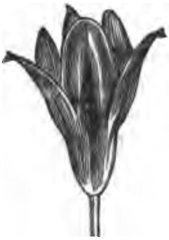
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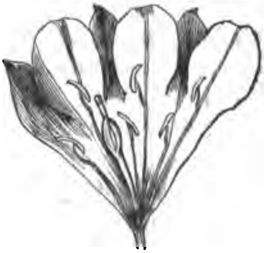
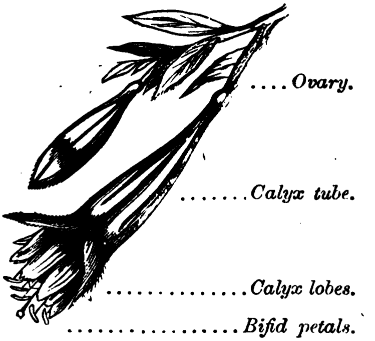

71

The Corolla is *Polypetalous* when the petals are free from each other (see Figs. 66, 68, 69, 73). In *Gamopetalous* corollas there are all degrees of cohesion from the complete union (Fig. 67) of the *Entire* limb to the almost free petals of a *Divided* corolla (Fig. 58). Petals often grow upon the calyx (Fig. 68). Corollas are *Regular* (Figs. 67, 69) or *Irregular* (Fig. 66, and Fig. 58, p. 3. See also the figures on p. 11 and p. 88b). Common forms of regular corollas are *Rotate* (Fig. 58), *Salver-form* (Fig. 64), *Funnel-form* (Fig. 67), and *Campanulate* or *Bell-shaped* when the tube expands suddenly at the base to a width nearly equal to that of the summit and about equal



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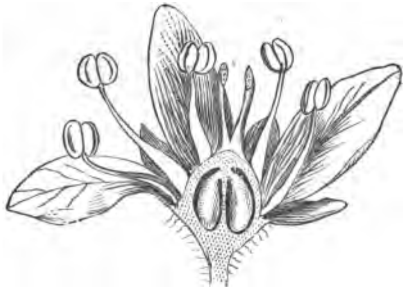

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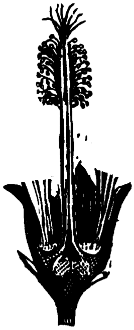
73. A flower of Whipplea, magnified, cut down through the center, showing the partly inferior ovary and the introrse anthers.



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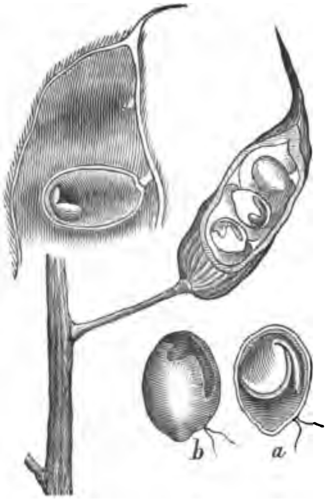
to a third of the length. Irregular flowers are frequently *Bilabiate* or *Two-lipped*, as shown in the figures *a* and *c* on p. 11, and the figures on p. 88b. When the tube of a corolla is slender, and the regular or irregular limb is small or wanting, the flower is said to be *Tubular*. The term *Perianth* is used to designate the calyx and corolla taken together. It is mostly used in describing endogenous flowers (Figs. 70, 71).

Stamens may grow upon the receptacle (Hypogynous, Fig. 69), upon the calyx (Perigynous, Fig. 68), upon the corolla (Fig. 67), or upon the pistil. Stamens are often united by their filaments so as to form tubes (Fig. 74) or bundles; or the anthers are joined, as in the Sunflower or Thistle. Sometimes there are two kinds of stamens in the same flower (Fig. 68). *Staminodia* are antherless or abortive stamens (see longer stamens in Fig. *e*, p. 8). *Anthers* usually consist of two cells, which are filled with *Pollen*. If the upper end of the filament lies exactly between the anther cells, the anther is *Innate*. An *Adnate* anther is attached by one side to the filament (Figs. 67, 68). A *Versatile* anther is attached between its ends by one side to the tip of the filament (Figs. 71, 72). The pollen usually escapes from slits in one side of the anther, as shown in Fig. 69. This side, which in an adnate or versatile anther, is opposite the filament, is called the face of the anther. When the anther faces the pistil, it is *Introrse* (Figs. 68, 71, 72, 73); and when it faces away from the pistil, it is *Extrorse* (Fig. 69).

The Pistil grows upon the receptacle, or upon a stem arising from it, called a *Stipe* (Fig. 71). In a few orders there are several or many pistils in each flower. Usually there is but one, formed of several simple pistils (carpels) united more or less closely. As in the other floral organs, there are all degrees of cohesion, from a slight union of the bases of the ovaries—rarely of the stigmas only—to such completeness as leaves no trace of lobes in the stigma (see Fig. on p. 5). Often the free styles tell how many carpels compose the pistil (Fig. 69). Generally the stigmas are divided or lobed (Fig. 68). These marks wanting a cross section of the ovary, or, better still, of the partly grown fruit, will usually shew a cell for each carpel (see the right-hand figure, p. 88b). If the ovules (or young seeds) are in the center or grow on more than one side of the ovary (or pod), the pistil is compound. A simple pistil is generally plainly one-sided. A symmetrical pistil is compound.

Inferior Ovaries. When the calyx adheres to the ovary, so as to form, after the ovary has matured, the outer part of the fruit, it is said to be superior, because the apparent calyx, its lobes, or cup, seem to grow upon the ovary. For the same reason the ovary is said to be inferior (Figs. 68, 72). There are all degrees of adhesion, from the slight union at the base, as seen in *Whipplea* (Fig. 73), to the remarkable extreme exhibited in the plant figured on p. 5, in which not only the ovary, but several inches of the style, is adherent to the calyx. When the adhesion is only partial, it can be shown by cutting the flower vertically, as represented in Fig. 73.

The Fruit is the ripened ovary (or set of ovaries), and all that directly belongs to it. A dry fruit which opens in any way to let out the seeds is called a *Pod.* A pod formed by the growth of a simple pistil (one-carpeled) is called a *Follicle* when it splits only along the side which bears the seeds. A *Legume* splits down both edges. Pods formed of several carpels are called *Capsules.* *Akenes* are dry, indehiscent, seed-like fruits, containing but one seed. *Utricles* are distinguished from akenes by their thin coats, which are too large for the inclosed seed.



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There are many other names applied to fruits, which it is not necessary to define here.

The Growth of Ovules. You can not study the development of ovules from the beginning, without the help of a compound microscope, but you can easily observe all stages of growth, from a tiny green speck to the full-grown embryo. Most seeds are nearly full grown in appearance before the embryo is more than fairly visible to the naked eye. The seed coat, filled with a syrupy or milky, usually sweet, liquid, appears to constitute the very young seed. With a sharp knife cut in halves a great many green peas, in size from half grown upward. You will surely find in some of them tiny green embryos, and you may get specimens from the size of a pin's head up to those which tightly fill the seed coat. In Fig. 75, at the top, is seen—magnified two diameters—the young seed of a lupine, cut so as to show the young embryo lying in one end. In the same figure is represented a radish pod, laid open so as to show three of the seeds, two of which exhibit their partly grown embryos.* Below, at *b*, is one of these magnified, and at *a* an older one, also magnified. The grown embryo completely fills the seed. Observe the positions of the embryos in relation to the stems of the seeds and the stems of the pods. The lower seed in the radish is fastened to the lower side of the pod, the middle seed grows to the upper side. The cotyledons increase much more in size than the radicle. The embryo evidently grows, in part at least, by absorbing the liquid around it. Suppose the embryo of the lupine to quit growing at the size represented in the figure, and that the liquid around it thickens until it becomes solid. Would not the seed thus formed be albuminous?

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*These are cut in two. The embryo may be seen through the seed-coat, as represented at *b*, by holding it up to the light. Half of the seed-coat is removed from *a*.

UNIV. OF CALIFORNIA

SYSTEMATIC BOTANY.

NAMES OF PLANTS: CLASSIFICATION.

In a general way we designate the objects around us by single names. We speak of a stone, a wolf, or a pine; but to distinguish the kinds we naturally use two names, as lime stone, sand stone; grey wolf, prairie wolf; nut pine, yellow pine, etc. This is one step in classification, and the only one commonly taken. This natural plan of double names was adopted by the great naturalist, Linnæus, who gave names to most European plants, as well as to many of this continent. He wisely gave the Latin form to his names, since that language (being the base of most languages spoken in civilized countries) is the natural source of cosmopolitan names—those truly common to all people. Botanical names, then, differ from so-called common names principally in form, and they have these decided advantages: they more exactly represent the relations between kinds of plants, and they are names that are common to people of all languages. In short, they are the true *common names.*

It is not true that botanical names are harder than local names. The most common of our ornamental plants are well known by their scientific names. No one thinks of calling the following botanical names hard: Geranium; Aster; Verbena; Petunia; Portulaca; Crocus; Phlox; Fuchsia; Iris; Magnolia; Oxalis; Azalea; Dahlia; Lobelia; Arnica, etc. Most people talk familiarly of Camellias, Callas, Begonias, Acacias; etc.: while our beautiful California plants, Clarkia, Collinsia, Eschscholtzia Nemophila, etc., are well known by their proper names—at least, in other countries.

Generic Names correspond to the second parts of the compound common names, as oak, pine, rose, etc. Some of these are the old Greek or Latin names of the plant. Most generic names are either derived from Greek or Latin words descriptive of some peculiarity of the plant, or they are commemorative of some botanist, as Thysanocarpus, from Greek words meaning fringe and pod; Kelloggia, in honor of Dr. A. Kellogg, a veteran botanist of this coast. Sometimes genera are named in honor of those who are not botanists, as Fremontia, Hollisteria, etc.

Specific Names are adjectives corresponding to the first parts of common names. They are usually descriptive of some characteristic of the plant, as *Gilia liniflora*, Flax-flowered Gilia. Frequently a species is named for the discoverer, as *Gilia Bolanderi*, Bolander's Gilia; often for the country where it was first found, or where it abounds, as *Ranunculus Californicus*, California Buttercup. Sometimes there are *varieties* of a species as *Trifolium barbigerum*, Var. *Andrewsii*, Andrews' Bearded-Clover.

Orders and Classes. Genera are grouped in Orders or Families, and these in Classes. There are two classes of flowering plants, *Exogens* and *Endogens*.

ANALYSIS OF PLANTS.

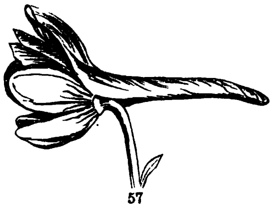
This whole matter of naming and classifying can be well understood only after you have analyzed many plants; *i. e.*, you must have carefully examined them part by part, and patiently compared their peculiarities with the descriptions in the *Flora* until you have determined their names. In the beginning there will be many failures; but do not allow them to discourage you, for each victory will make the way easier to other conquests.

Choose for your first studies plants with large flowers. Do not attempt to determine the name of a plant unless you have specimens which show the kind of inflorescence and the arrangement of the leaves on the stem. If possible, secure specimens of the fruit and the roots. If in any plant you cannot readily distinguish the parts of the flower and their relations to each other, lay it aside until the study of easier plants has given you more skill.

The first thing to be determined in analyzing a plant is the Class; *i. e.*, you must decide whether it is an Exogen or an Endogen. You have learned in the preceding lessons how the seeds and stems of these two Classes of Flowering Plants differ. Usually, however, the leaves and flowers sufficiently distinguish the class. In our plants, if the leaves are parallel-veined; or, if the parts of the flower are in threes the plant is an endogen. In other words, if there is no network of intersecting fibers between the ribs of the leaves the plant is an endogen; if the flower has three sepals and three petals (*i. e.*, a perianth of six leaves or lobes), three or six stamens and three or six pistils (generally united to form a compound pistil with a three or six-celled ovary) the plant is an endogen. When the leaves are netted-veined, and the parts of the flower are not all in threes, the plant is an exogen.

It is a good plan to write out a description of a plant before attempting to ascertain its name. The parts may be described in this order: Roots, Stems, Leaves, Flowers, Fruit.

You may find a smooth plant bearing a loose raceme of red flowers, one of which is represented in Fig. 57. The floral leaves are all colored, but there are evidently two sets; viz.: a calyx of 5 sepals inclosing a corolla of 4 petals. The parts of the flower, then, are not in threes; and, since the palmately lobed leaves are netted-veined the plant must be an exogen. Turning to the key, we proceed as follows: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The plant must belong in "DIVISION 1," since by carefully removing the sepals and petals we find that the latter are separate from each other. It must be found under "A," for there are many stamens. The stamens are free from the calyx and corolla, *i. e.*, they are hypogynous; so we read the next line: "Pistils, few to many distinct carpels, rarely one." Our flower has three distinct carpels, therefore we feel sure that it must be sought under one of the next five equal lines beginning with "Calyx." As the calyx is easily shaken off from the older flowers we decide that it is deciduous. The juice is colorless also. We turn, therefore, to RANUNCULACEÆ, p. 16. The description of the order is satisfactory. The key to the genera begins with the heading "**Flowers regular*." Ours is not, for the upper sepal is unlike the others. "***Flowers irregular; colored sepals conspicuous*," is right. We now choose between "Upper sepal spurred,' and "Upper sepal hooded." Evidently the first is right, and the genus is *Delphinium*. We find that the generic description on p. 18 fits our plant. The last species being the only one with red flowers, we decide that our plant is *Delphinium nudicaule*, or the Naked-stemmed Larkspur.

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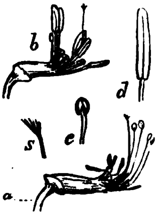

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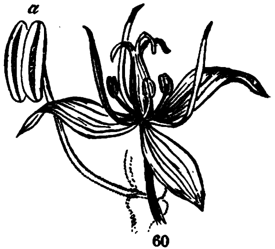
The order Leguminosæ, or the Pea Family, is one that you will soon learn, since its characteristics are well marked. We will suppose that you have before you a very common blue-flowered shrubby plant belonging to that order, a single flower of which is shown in Fig. 58. Knowing the order, you turn at once to p. 38, and begin to use the key to the genera.

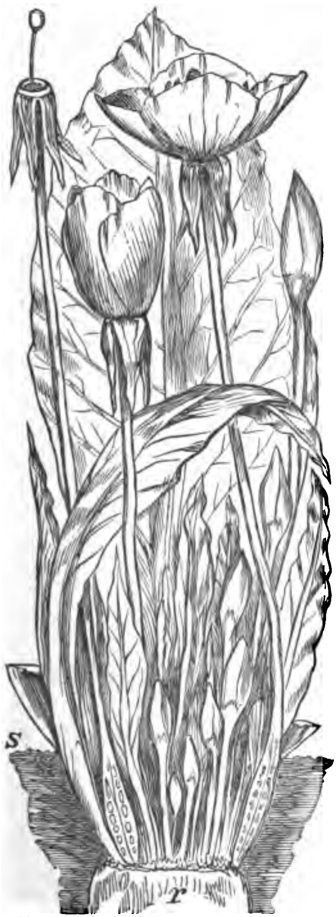
Carefully removing all the petals, the stamens and pistil appear as in *a*, Fig. 59. The filaments are united for the greater part of their length into a tube which incloses the ovary as a sheath does a knife. Of the three sections in the key, then, it is evident that the second is to be taken. Since some of the anthers have shed their pollen, and others have not, it is safe to say they are of two kinds—a bud will show the difference better (*b*, Fig. 59.) Moreover the leaves are digitate, and have more than three leaflets We therefore conclude that the third genus is the one. Our plant is slightly shrubby, so we pass over the first heading in the synopsis of species. Of the second and third headings the last seems the most likely to lead us aright. Our flower is blue, so we have to choose between the second and third species. The words "Slightly woody at the base," decide us in favor of *Lupinus Douglasii*, though we should examine more specimens before being quite positive.

Fig. 60 represents a flower of a plant common in the Redwood forests. Three or more of the dull-colored flowers grow in an umbel on a very short scape between a pair of spreading radical leaves. Since the leaves have parallel veins, and the parts of the flower are in threes, we must use the Analytical Key for Endogens, p. 13. You will have no difficulty in referring the plant to the ORDER LILIACEÆ. To make the analysis of a plant in that large order easy, the genera are grouped in three Series. Reading the characteristics of SERIES I, we find they do not correspond with those of our plant, which has no floral bracts, which has the stamens hypogynous instead of perigynous, the anthers extrorse instead of introrse, etc. Comparing Series II with Series III, we decide that our plant belongs in the former, since the perianth is not persistent, and the flowers are not in racemes or panicles. § 1, in Series II is wrong, for our plant has no leafy stem. Since the perianth segments of our flower are dissimilar we try § 3, under which we refer our plant to the

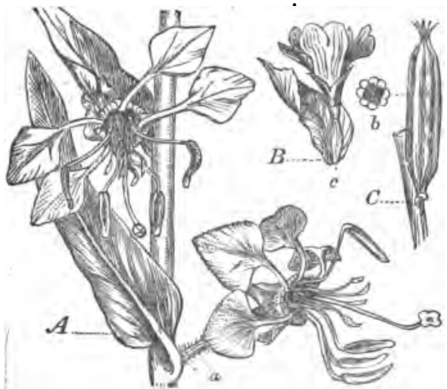


60. Flower of Scoliopus. *a*, one of the stamens magnified, showing the bursting anther cells.

genus *Scoliopus*. Turning to the description of the only species described, we find it satisfactory. Upon referring to the Glossary of Generic and Specific Names in the back part of the book, we find why the plant was named *Scoliopus Bigelovii*.



This picture represents part of a plant whose yellow flowers are among the first to greet the new year. It is shown as it would appear if cut down through the center after removing most of the outer leaves. The leaves and flowers all grow from the flat summit of a thick root-stock. It will be noticed that the buds are younger as the center is approached. Possibly you have tried to analyze one of these flowers. If so, you probably got on nicely till you tried to find the ovary. I hope you kept searching and at last felt the satisfaction which rewards the discoverer. However, you can determine the name, and thus have the book tell you where the ovary is. The poorest eyes can see that the leaves are all radical; that the four divisions of the calyx are reflexed; that four broad petals and eight stamens grow upon it; and that there is one pistil whose slender style bears a globose stigma. You can not doubt that the plant is to be sought under B., in Division 1, but you are unable to say whether the ovary is superior or not. In such a case, search first for the order under the head "OVARY SUPERIOR;" and, if not satisfied there, try the head "OVARY AND FRUIT INFERIOR." Since there is but one pistil, you look under "* * *Pistil only one.*" The plant is not a shrub, so you next stop at "† † *Herbs.*" The first division under this is the only one admissible, because the leaves are all *radical.* But in no case under this head is the number of stamens eight. We therefore try the sub-head "2. OVARY AND FRUIT INFERIOR," etc. It is evident that the descriptive line, "Parts of the flower mostly in 4's," etc., is the only one that fits our plant, so we turn to p. 59, where we find nothing in the description of the order Onagraceæ to rule our plant out. The lines descriptive of the genera are all unsuited to our plant, except one, which refers us to the genus Œnothera, the de-



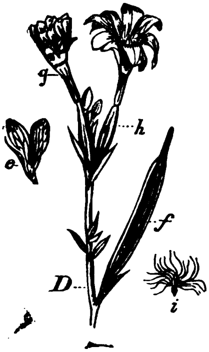
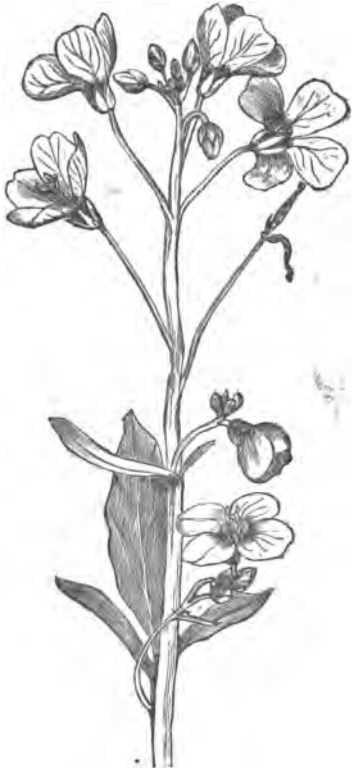


Fig. A. Clarkia elegans; *a*, inferior, sessile ovary of the axillary flower. Fig. B. Boisduvalia densiflora; *c*, inferior ovary, sessile in the axil of a bract. Fig. C. Capsule of Godetia; *b*, cross section of the same. Fig. D. Epilobium paniculatum; *h*, inferior ovary; *f*, a grown capsule; *g*, tube of calyx above the ovary; *e*, one of the bifid petals; *i*, one of the seeds bearing a tuft of silken hairs.

The figure on the right represents Cardamine paucisecta, a pod of which is represented at *e* on the opposite page.

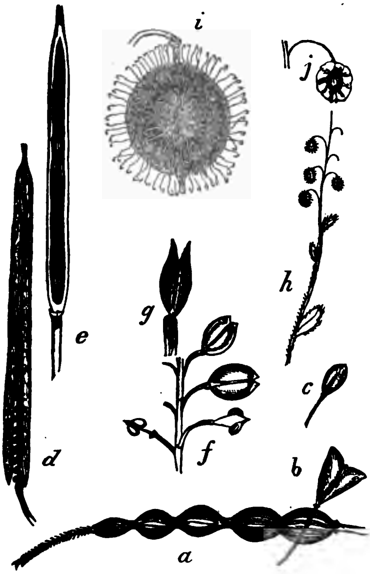


scription of which (p. 60) is satisfactory. Our plant is *acaulescent* or stemless; therefore, according to the book, the calyx tube is filiform (slender) above the underground ovary. This being verified by examination, there can be little doubt that the plant is *Œnothera ovata.* You now see that the flowers, instead of growing upon scapes, are sessile upon the end of a root-stock. The apparent flower stem is the slender calyx tube and style consolidated. When you plucked the flower, the ovary was left under the ground. No wonder you could not find it. Later in the season you will find other plants belonging to this order; then the figures above will help you.

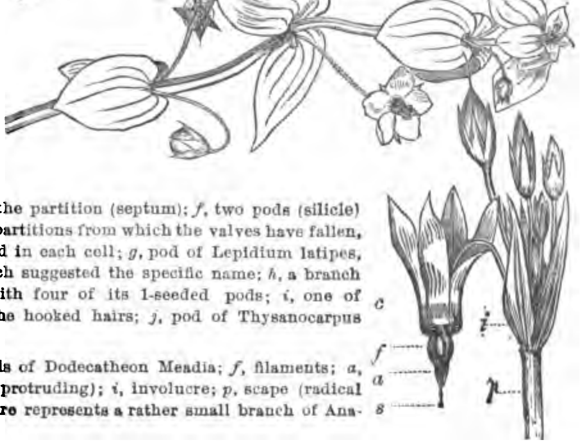
The figure at the right above represents the upper part of a plant which usually grows in moist places. The white flowers have four separate sepals; four petals; six stamens in two sets, two being shorter and otherwise different from the other four, and one pistil.

These characters lead you in the key to the order Cruciferæ, but it is not easy to decide farther, because you have not the fruit. Look for the pods a few weeks later, and you will find them long and flat, as represented in the figure at *e* on the left. You can then determine the name of the plant. The seed pods here figured will help you in determining some of the plants in this order.

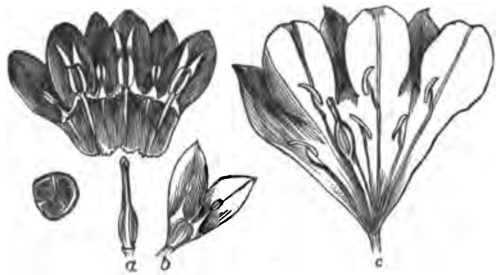
The curious flower depicted below is another early bloomer.' You must cut the flower open and study it carefully. The four—sometimes five—petals are joined together, and bear upon the short tube the four stamens which hug the pistil tightly and form a beak like that of a bird. The ovary does not adhere to the calyx, and if a seed pod is partly grown, it will be easy to see that the seeds grow upon a central placenta. Turning to the key you are called upon to decide whether the stamens are opposite the lobes of the corolla or not. They certainly are opposite, so the order Primulaceæ is evidently where our plant belongs. The pretty little foreigner Anagallis is here figured, and it will be

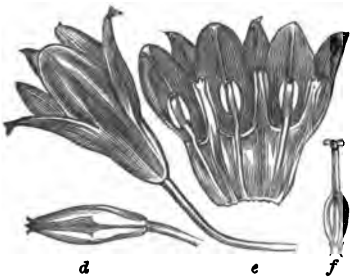


UPPER FIG. — *a*, indehiscent pod of Raphanus Raphanistrum; *b*, pod (silicle) of Capsella Bursa-pastoris; *c*, pod of Capsella divaricata; *d*, pod (silique) of Tropidocarpum, flattened contrary to the partition; *e*, pod of Cardamine paucisecta, flattened parallel with the partition (septum); *f*, two pods (silicle) of Lepidium nitidum, and two partitions from which the valves have fallen, showing that there was one seed in each cell; *g*, pod of Lepidium latipes, showing the broad pedicel which suggested the specific name; *h*, a branch of Thysanocarpus pusillus, with four of its 1-seeded pods; *i*, one of the pods magnified to show the hooked hairs; *j*, pod of Thysanocarpus curvipes.



LOWER FIG.—*c*, reflexed petals of Dodecatheon Meadia; *f*, filaments; *a*, anthers; *s*, stigma (not always protruding); *i*, involucre; *p*, scape (radical peduncle). The horizontal figure represents a rather small branch of Anagallis arvensis.





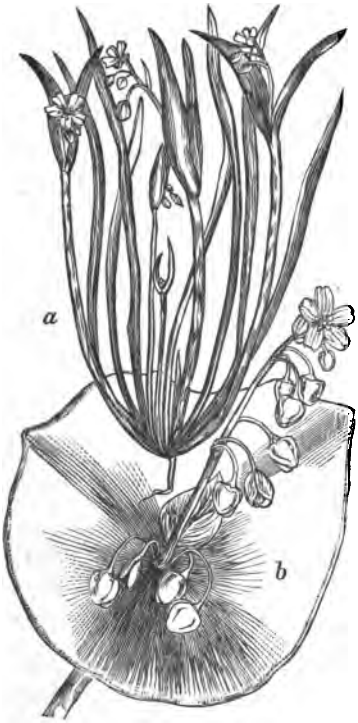
a. Perianth of Brodiæa capitata laid open, with pistil and section of mature capsule. *b*. Two segments of the perianth of B. lactea and the pistil. *c*. Perianth and pistil of B. laxa. *d*. Bud and flower of B. terrestris. *e*. Same with perianth laid open. *f*. The pistil.

well to read the description of Trientalis, that you may know it when found.

When you get a head of the purple-blue flowers of *Brodiæa capitata*, figured on page xxiv of this book, it will be the proper time to study the figures on this page, and what is here said about the genus they illustrate.

Upon p. 113 you will find the species grouped under three sub-genera or sections. Figures *a*, *d*, and *e* illustrate the first, *c* the second, and *b* the third. The species belonging to the first section are arranged under two heads marked by asterisks, and those under the first head are under subheads marked by daggers. Species 4 and 5 closely resemble number 6, which is put under a different head, because it has six true or anther-bearing stamens instead of three stamens and three staminodia. Fig. *a* shows that three of the filaments came near being antherless. Petaloid staminodia replace these small stamens in species 4 and 5, and the fertile stamens are without the winglike appendages shown in Fig. *a*. Observe that the staminodia in one of these species are cleft. The first three species have flowers resembling the one shown in Figs. *d* and *e*, in which the staminodia (opposite the outer segments of the perianth) are not petaloid, but resemble true stamens. Observe that the first species is distinguished by staminodia not notched at the top as shown in the figure. The species in § *Seubertia* resemble the first three in general appearance, but the stamens and pistils are very different, as is shown by Fig. *c*. Observe that the stamens have versatile instead of basifixed anthers; and the ovary is upon a stipe, instead of being sessile. Douglas' Brodiæa, of Oregon, is like Fig. *c*, only the base of the perianth is broader, the upper row of stamens have broad bases, the stipe is shorter and the flowers are on short pedicels, so as to form a subcapitate umbel. The most common species of the third section is the White Brodiæa. Fig. *b* shows a part of the flower.

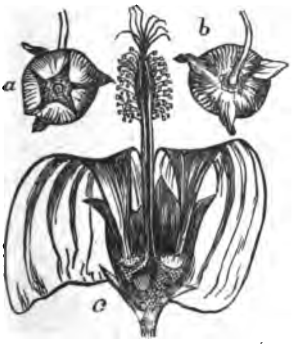
The middle figure on the next page represents a plant, the curious cup-like leaves of which must have attracted your attention. The leaf cups are frequently much larger than here shown, and borne upon stems a foot or more in height. Though the flowers are small,



you readily decide that the sepals are two, and that there are five petals and five stamens. The seed pods show that there is but one pistil, and that the calyx does not adhere to the ovary; that is, the ovary is superior. Armed with this information, you turn to the key where you search under "B. STAMENS 10 or less." Evidently the correct subheads are: "1. Ovary, or ovaries, superior," etc.; "* * *Pistil only one;*" "† † *Herbs;*" "‡ *Leaves mostly radical;*" "Stamens 5, opposite the petals; sepals 2; style 3-cleft—Portulacaceæ, 29." Turning to p. 29 you find that *Claytonia* is the only genus having 5 stamens, and that this plant must be *Claytonia perfoliata.*

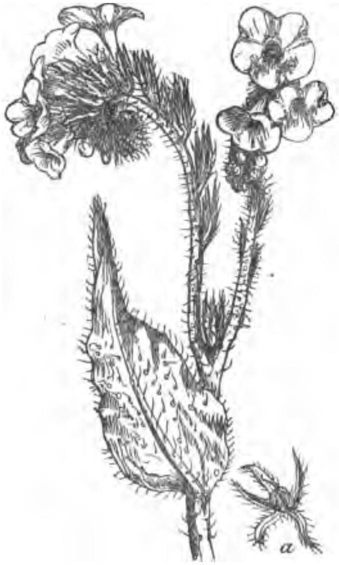
The little plant figured above (*a*) evidently answers to the description of the Var. *exigua*, which is now considered by the best authority to be a distinct species. The stem leaves are sometimes broad and united at the base. The radical leaves are nearly terete, as shown in the figure. This species is most obviously distinguished from the two varieties of the Cup-leaved Claytonia, by its glaucous leaves. The plants are often smaller than here represented, and rarely much larger.

Kellogg's Lavatera, or Tree Mallows, an ever-blooming shrub, common in cultivation, is a constant source of material with which to illustrate the Mallows Family. The figure at the bottom of the page represents one of the flowers cut through the center, so as to show the structure. The fruit of a very common weed of the same family is also shown. The most common native plant is *Sidalcea humilis,* described on page 32. Hollyhock, cotton, okra and Abutilon are foreign plants of this order, common in cultivation. The latter is a shrub with drooping flowers; the petals incurved, and the stamens sticking out (exserted).



UPPER FIG.—*a.* Claytonia exigua (entire plant). *b.* Claytonia perfoliata.

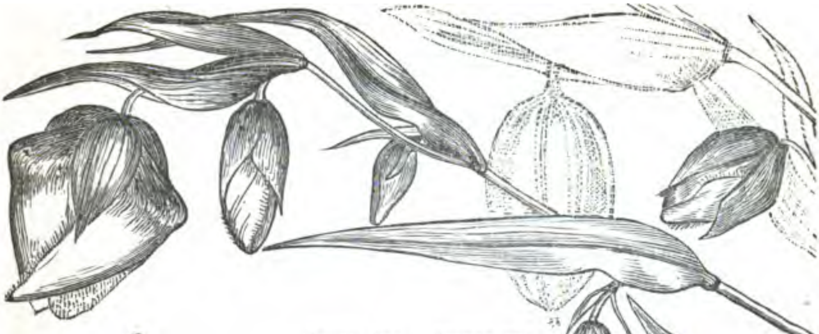
LOWER FIG.—*a.* Fruit of Malva rotundifolia. *b.* Same, showing the bracts of the persistent calyx. *c.* Kellogg's Lavatera. (L. assurgentiflora.)

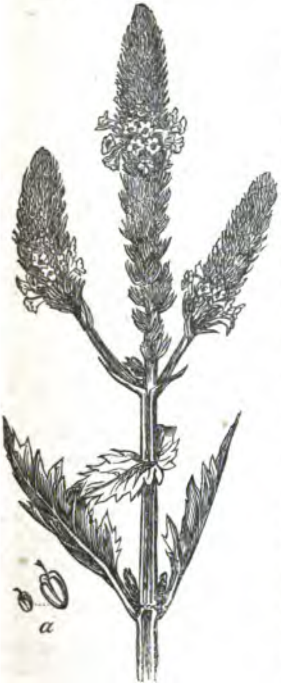


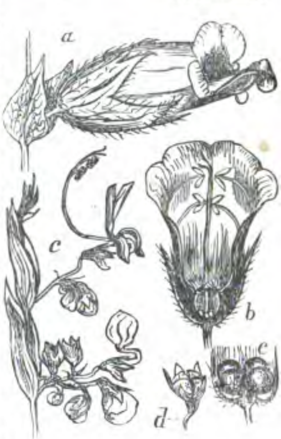
Amsinckia lycopsoides. *a.* Calyx spread apart to show the ripe akenes.

You may recognize in the picture on this page the likeness of one of our most troublesome native weeds. The yellow flowers are often smaller than here represented, and the upper leaves are generally narrower. Indeed, this plant, along with many others of this coast, is provokingly variable in its appearance. Pull off a corolla, and a single undivided style is uncovered. Follow this down into the calyx, and you discover that it grows from between four seed-like ovaries. These are more easily seen in an older calyx, as shown at *a*. Now it happens that this peculiar compound ovary, together with the coiled inflorescence, belongs only to plants of the order Borraginaceæ. A coiled inflorescence and a pistil with a divided style is found only in plants of the order Hydrophyllaceæ. Any plant with a four-parted ovary and regular flowers may be sought under the former order. Creeping Heliotrope or Blue Weed (*Heliotropium Curassavicum*) is a Borraginaceous plant with ovaries merely 4-lobed. The Mint Family has fruit similar to that of the Borrages (see *d* and *e* in the figure on p. 11), but the flowers are irregular. The Verbenas are distinguished from the Mints by nearly regular flowers and a 4-lobed ovary, which does not split into parts until quite ripe. (See *a* in the left-hand figure on page 11.)

The plant figured at the top of the opposite page is common in open woods throughout the Coast Ranges and the foot-hills of the Sierra Nevada. The flowers are white, tinged with purple. Each of the three incurved petals is covered with hairs on the inner side, and is marked near the base by a depression which is seen upon the outside as a projecting boss. This is called a gland, and is one of the characteristic marks of the genus. Since the three-cornered ovary is superior, we at once refer the plant to the order Liliaceæ, where we again read the characters given in each of the three series. The stamens in this plant are hypogynous, not perigynous, and the anthers are extrorse. Therefore, SERIES I is passed. SERIES III is excluded, because the anthers in this plant are not versatile. Evidently the name is to be sought under SERIES II, which is divided into three sections. You now see why you should have dug up one of the plants. However, you can decide the genus without knowing that the plant is bulbous. It can not belong to § 3, since one of the two genera under it has umbellate flowers, and the other solitary flowers. In § 2, the perianth segments are similar. Our plant then must be sought in § 1, and under the head "* * Perianth segments unlike," which leads to Calochortus,







UPPER FIG. — Flower and buds of Calochortus albus, and the three-winged fruit outlined.

RIGHT-HAND FIG.—*a*. Flower of Sphacele calycina. *b*. Same with corolla cut to show stamens, pistil, and hairy ring inside. *e*. Fruit (4 globular akenes) of the same, lying in the bottom of the calyx. *c*. Flower and buds, showing inflorescence of Trichostema lanceolatum. *d*. Ripe fruit of the same (4 triangular akenes in the persistent calyx).

LEFT-HAND FIG. — Verbena hastata (spikes and bracts). *a*. Ripe fruit removed from the calyx (natural size and magnified).

p. 117. The subglobose and nodding flowers place it in the first division of § 1, *Eucalychortus*. Our plant is the white species. The yellow species has larger flowers. The stiffly erect, open flowers of § 2 of this genus have a markedly different appearance from the species here figured; yet their structure is similar. The spots upon the petals cause them to **resemble the wings of butterflies; hence the common name Butterfly Tulip, and the section name *Mariposa*.**

DIRECTIONS.

Analyze the plant first as directed on page 4 of the West Coast Key. Make the following changes in Flora to correspond with the Key. The numbers indicate pages

17. Thalictrum Fendleri is T. polycarpum.
18. Ranunculus macranthus is R. orthorhyncus.
25. Lepidium Menziesii, var. strictum is L. strictum.
25. Thysanocarpus pusillus is Athysanus pusillus.
26. Viola aurea is V. præmorsa.
30. Claytonia perfoliata, var. exigua is C. exigua.
" " " var. spathulata is C. spathulata.
32. Sidalcea humilis is S. malvæflora.
41. Lupinus micranthus, var. trifidus is L. trifidus.
43. Trifolium amplectans is a var. of T. depauperatum.
48. Astragalus didymocarpus is partly A. nigrescens.
49. Lathyrus venosus, var. Californicus is L. Californicus and partly L. Bolanderi of the Key.
51. Spiræa is Holodiscus and Neilia is Physocarpus.
66. Plectritis is Valerianella with same specific names.
74. Asclepias fascicularis is A. Mexicana.
" Gomphocarpus purpurascens is Schiznotus purpurascens and should be called *Towle's Milkweed* in honor of the discoverer, C. B. Towle.
75. Gentiana affinis var. ovata is G. ovata.
77. Gilia divaricata is G. glutinosa; G. Sessei is G. heterophylla.
82. Phacelia tanacetifolia is partly P. distans.
85. Eritricium Californicum is Krynitzkia Californica; E. Scouleri is K. Scouleri; E. Chorisianum is K. Chorisiana: E. oxycaryum is K. oxycarya; E. fulvum is Plagiobothrys nothofulvus; E. canescens is P. canescens.
87. Convolvulus luteolus is only a form of C. occidentalis.
88b. Solanum nigrum, var. Douglasii is S. Douglasii.
93. Mimulus pilosus is M. exilis.
95. Orthocarpus faucibarbatus is O. erianthus, var. lævis.

Why these changes should be made is "too long a story."

ANALYTICAL KEY.

The calyx and corolla together of either more or less than six parts*	**CLASS I**	
The calyx and corolla together of 6 parts:		
Stamens 6 or less	**CLASS II**	
Stamens 9;	**Umbellularia**, p. 106, or **Eriogonum**,	105
Stamens 10; united sepals 5	**Leguminosæ**,	38
Stamens many; caducous sepals 2	**Papaveraceæ**,	20
Stamens many; sepals 3	**Sagittaria**,	122

CLASS I.—EXOGENS OR DICOTYLEDONS.

Calyx and corolla both present.	
Petals not united (free)	**Division 1**
Petals more or less united (cohering)	**Division 2**
Corolla wanting; calyx often petaloid, sometimes wanting	**Division 3**

DIVISION I.—POLYPETALÆ.

A. Stamens more than 10 and more than double the number of petals.

1. **HYPOGYNOUS,** *i. e.,* on the receptacle (not adhering to the sepals or petals).

** Pistils few to many distinct carpels, rarely one.*

Calyx deciduous, sepals 5	**Ranunculaceæ**,	16
Calyx caducous, sepals 2 or 3	**Papaveraceæ**,	20
Calyx persistent, sepals 3 or 4; aquatic plants	**Nymphæaceæ**,	20
Calyx persistent; leaves all radical	**Rosaceæ**,	49
Calyx petaloid; corolla wanting	**Ranunculaceæ**,	16

** * Pistil one and compound, as shown by two or more stigmas, or more than one cell in the ovary.*

Petals more numerous than the sepals.		
Indefinitely numerous, slender, persistent; aquatic plants	**Nymphæaceæ**,	20
Just twice as many (4–6); sepals caducous	**Papaveraceæ**,	20
Five to sixteen; sepals persistent; fleshy herbs	**Portulacaceæ**,	29

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* **Maianthemum (see p. 115) has a 4-parted perianth; 4 stamens and 2 or 3 parallel-veined leaves.**

Petals of the same number (5) as the persistent sepals, yellow.
Leaves opposite; sepals equal.................................**Hypericaceæ,** 30
Leaves alternate; 2 outer sepals smaller.............................**Cistaceæ,** 25

2. **PERIGYNOUS** or **EPIGYNOUS** (on the free or adnate calyx).

Leaves opposite, simple; fleshy herbs...............................**Ficoideæ,** 63
Shrubs. Sepals and petals numerous.....................**Calycanthaceæ,** 55
Sepals and petals 4 or 5...........................**Saxifragaceæ,** 55
Leaves alternate, with stipules..**Rosaceæ,** 49
Without stipules; rough herbs......................**Loasaceæ.** 62

3. **ON THE CLAWS OF THE PETALS.**

Stamens free; calyx a cap; petals 4................................**Papaveraceæ,** 20
Stamens many united to form a tube; petals 5...........................**Malvaceæ,** 31
Stamens 10 to 16 united for half the length; petals 5–8 ....**Styracaceæ,** 20

B. Stamens 10 or less.

1. **OVARY** or **OVARIES SUPERIOR** (free from the calyx), or mainly so, but sometimes included in the calyx-tube.

* *Pistils more than one and distinct* (*not united*).

Pistils of the same number, as petals and the sepals.
Leaves simple entire, fleshy.....................................**Crassulaceæ,** 58
Leaves pinnate; styles united.......................................**Geraniaceæ,** 33
Pistils not corresponding in number with the petals and sepals.
Two, united at the base. Trees with compound leaves ....**Sapindaceæ,** 37
Herbs with simple leaves...........**Saxifragaceæ,** 55
Many. Stamens on the receptacle...................................**Ranunculaceæ,** 16
Stamens on the calyx......................................**Rosaceæ,** 49

* * *Pistil only one.*

† *Shrubs or trees.*

Style and stigma one.
Sepals, petals, and stamens 6 each, in 3's opposite each other..**Berberidaceæ,** 19
4 to 5 each; leaves 3-foliolate, alternate..**Rutaceæ,** 34
5 each; leaves simple, opposite......**Celastraceæ,** 35
Calyx 2-lipped; petals unequal; stamens 5–8, exserted..........**Sapindaceæ,** 37
Calyx 4-toothed; petals 2; stamens 2–4; fruit a samara..........**Oleaceæ,** 73
Styles or stigmas more than one.
Styles 2; leaves opposite; fruit 2-winged..............................**Sapindaceæ,** 37
Style 3-cleft; stamens 5, opposite the small petals..............**Rhamnaceæ,** 35
Stigmas 3; leaves alternate 3-foliolate.........................**Anacardiaceæ,** 38
Stigma 5-lobed; a small shrub with opposite or whorled leaves.....**Ericaceæ.** 68

† † *Herbs.*

‡ *Leaves mostly radical.*

Stamens 5, anthers united; lower petal spurred; style 1	Violaceæ,	25
Stamens 5, opposite the petals. Sepals 2; style 3-cleft	Portulacaceæ,	29
Sepals united; styles 5	Plumbaginaceæ,	71
Stamens 10, on the receptacle; stigma 5-lobed	Ericaceæ,	68
Stamens 10, on the calyx; styles 2	Saxifragaceæ,	55
Stamens 6, in 3's; sepals 2; petals 4, in pairs	Fumariaceæ.	22

‡ ‡ *Leaves alternate.*

Corolla regular.		
Stigma one, often 2-lobed; stamens 6 (2 and 4)	Cruciferæ,	22
Stigma 1, calyx a striated tube bearing 6 petals	Lythraceæ,	59
Stigmas 5; sepals and petals 5 each; stamens 5–10	Geraniaceæ,	33
Styles 3–5; sepals and petals 5 each; stamens 5	Linaceæ,	32
Style 3-cleft; sepals 2; petals 5; fleshy herbs	Portulacaceæ,	29
Corolla irregular; style one.		
Stamens 10; fruit a legume	Leguminosæ,	38
Stamens 5; anthers united; lower petal spurred	Violaceæ,	25
Stamens 6, in 2 sets; stigma 2-lobed	Fumariaceæ,	22
Stamens 6–8, united; ovary 2-celled	Polygalaceæ,	27

‡ ‡ ‡ *Leaves opposite or whorled.*

Styles 2–5; fruit a 1-celled capsule; stamens 10 or 5	Caryophyllaceæ,	27
Styles 3; flowers sessile; stamens 4 to 7	Frankeniaceæ,	20
Styles or stigmas 5; fruit 5 akenes	Geraniaceæ,	33
Small white flowers clustered on terminal peduncles	Saxifragaceæ,	55
Leaves in 3's; white flowers; petals 6 in 2 sets	Papaveraceæ,	20
Leaves a single pair on the stems; fleshy	Portulacaceæ,	29

2. OVARY AND FRUIT INFERIOR (adherent to the calyx), or mainly so.

Shrubs; sepals, petals, and stamens each 4–5; leaves simple.		
Stamens opposite the clawed petals; style 3-cleft	Rhamnaceæ,	35
Sepals petaloid; ovary globose; styles 2, or 2-cleft	Saxifragaceæ,	55
Leaves opposite; flowers in heads with petaloid involucre or in cymes; the sepals, petals, and stamens 4 each	Cornaceæ,	63
Herbs. Sepals and petals each 5; styles distinct; leaves simple	Saxifragaceæ,	55
Parts of the flower mostly in 4's (rarely in 2's or 6's)	Onagraceæ,	59
Tendril-bearing vines, with prickly fruit	Cucurbitaceæ,	63
Flowers in umbels; styles 2	Umbelliferæ,	63

DIVISION 2. GAMOPETALÆ.

A. Ovary Inferior (adherent to the calyx) or largely so.

Stamens more numerous than the lobes of the corolla, 8 or 10.
Distinct and free from it, or nearly so............................**Ericaceæ**, 68
Stamens as many as the lobes of the corolla (5, rarely 4), united into a tube.
Flowers in an involucrate head, resembling a single blossom......**Compositæ**, 66
Flowers separate in racemes or spikes; ovary slender ....**Lobeliaceæ**, 67
Stamens as many as the corolla-lobes, distinct.
Nearly or quite free; leaves alternate, no stipules...........**Campanulaceæ**, 67
Inserted on the corolla; leaves opposite or whorled.
With stipules, or in whorls, entire ....**Rubiaceæ**, 65
Without stipules, opposite. Calyx with minute lobes...**Caprifoliaceæ**, 64
Prostrate herbs. *Abronia in*..........................**Nyctaginaceæ**, 104
Stamens only 3, fewer than the lobes of the corolla.
Leaves opposite; stamens distinct; flowers minute ....**Valerianaceæ**, 66
Leaves alternate; stamens united; fruit prickly..............**Cucurbitaceæ**, 63

B. Ovary Superior (free from the calyx) or nearly so.

1. FLOWERS REGULAR or nearly so.

* *Stamens, twice as many as the lobes of the corolla.*

Stamens 8–10, distinct; corolla campanulate or ovoid......................**Ericaceæ**, 68
Filaments united for half their length; corolla nearly polypetalous........**Styrax**, 20
Pistils or styles as many as the petals; fleshy herbs................**Crassulaceæ**, 58

* * *Stamens as many as the lobes of the corolla and opposite them.*

Styles 5; long-clawed petals, scarcely united..................**Flumbaginaceæ**, 71
Style 1; corolla lobes, reflexed or rotate.................................**Primulaceæ**, 72

* * * *Stamens as many as the lobes of the corolla and alternate with them.*

Style and stigma one, leaves entire (lobed in the first).
Leaves mostly radical; flowers on a scape.......*Romanzoffia in* **Hydrophyllaceæ**, 80
Leaves all radical; flowers in a spike; 4-lobed corolla scarious.....**Plantaginaceæ**, 103
Leaves alternate; flowers mostly in coiled spikes; ovary 4-lobed....**Borraginaceæ**, 83
Leaves alternate; flowers rotate to funnelform; ovary 2-celled.........**Solanaceæ**, 88
Leaves opposite; flowers in cymes; ovaries 2.......................**Apocynaceæ**, 73
Leaves opposite or whorled; flowers in umbels; ovaries 2........**Asclepiadaceæ**, 73
Style 1 or none, stigmas 2.
Leaves opposite or whorled, sessile, entire, or.................. } **Gentianaceæ**, 74
Leaves alternate, 3-foliolate, on a creeping rootstock .... }

Leaves alternate; twining vines; flowers funnelform, axillary.....Convolvulaceæ, 86
Leaves alternate; flowers not axillary........................Hydrophyllaceæ, 80
Leaves alternate; flowers in a head, with acerose bracts..................*Gilia*, § 5, 78
    Style 2-cleft..Hydrophyllaceæ, 80
    Style 3-cleft, or stigmas 3...Polemoniaceæ, 75
    Style 2; leaves simple or none.
Flowers solitary in the axils of small leaves.................. }
Flowers clustered on filiform parasitic stems.................. } Convolvulaceæ, 86
Flowers in naked cymose clusters; shrubs.....................Hydrophyllaceæ, 80

** * * * Stamens fewer than the lobes of the slightly irregular corolla.*

***Limosella* or *Veronica* in...Scrophulariaceæ, 93**

2. FLOWERS IRREGULAR. Stamens with anthers 4 in pairs or 2; style 1; leaves opposite or none, except in some of the Scrophulariaceæ.

Ovary 1-celled; corolla curved; leafless root parasites............Orobanchaceæ, 96
Ovary 2-celled..Scrophulariaceæ, 89
Ovary 4 parted, forming in fruit 4 seedlike nutlets.......................Labiatæ, 97
Ovary 4-lobed; fruit splitting into 4 nutlets.........................Verbenaceæ, 102

DIVISION 3. APETALÆ.

A. Ovary inferior (calyx adherent) or apparently so.

Leaves cordate; calyx 3-lobed; capsule 6-celled..............Aristolochiaceæ, 104
Leaves opposite; calyx salver-form; ovary 1-seeded..............Nyctaginaceæ, 104
Leaves opposite; calyx inconspicuous; corolla tubular.............Caprifoliaceæ, 64

B. Ovary superior (free from the calyx).

** Herbs; leaves alternate.*

Petaloid calyx withering-persistent; akene 3-cornered or flat........Polygonaceæ, 105
Petaloid sepals deciduous; carpels several..........................Ranunculaceæ, 16
Sepals 4, green, deciduous; small pods 2-celled...........................Cruciferæ, 22
Flowers asepalous in a spike, with a petaloid involucre...............Anemopsis, 106

** * Herbs; leaves opposite, entire.*

Capsule 1-celled; style and stigma 1; leaves fleshy.
    Stems prostrate; flowers in involucrate heads..............Nyctaginaceæ, 104
    Stems erect; flowers axillary........................*Glaux in* Primulaceæ, 73
Capsule 1-celled; style or stigmas, 3 or more....................Caryophyllaceæ, 27
Capsule 3-5-celled; flowers axillary. ....*Mollugo in* Ficoideæ, 63

* * * *Shrubs or trees; leaves alternate, entire (except in the last).*

Calyx tubular, bearing the stamens; akene tailed	Rosaceæ,	49
Calyx 6-parted, yellowish; leaves aromatic	Lauraceæ,	106
Calyx 4–5-cleft, greenish; fruit cherry-like	Rhamnaceæ,	35
Calyx 3–4-cleft, yellowish; stamens 6–8	Thymelaceæ,	107
Calyx 5-cleft, bright yellow; stamens 5, united	Sterculiaceæ,	20

* * * * *Trees; leaves opposite, pinnate.*

Fruit a slender samara	Oleaceæ,	73
Fruit a double samara	Sapindaceæ,	37

* * * * * *A half-woody climber; leaves opposite.—Clematis, 16.*

CLASS II.—ENDOGENS OR MONOCOTYLEDONS.

A. Perianth adherent to the ovary (ovary inferior).

Flowers irregular. Anthers 1 or 2 on the pistil	Orchidaceæ,	108
Flowers regular. Stamens 3, anthers extrorse	Iridaceæ.	110

B. Perianth free (ovary superior).

Flowers in whorls. Carpels 8 to many	Alismaceæ,	108
Pistil 3-celled; stamens 3 to 6	Liliaceæ,	110
Flowers greenish in a spike	*Triglochin* in Alismaceæ,	108
Perianth 4-parted; stamens 4. Stem 2–3-leaved	*Maianthemum*,	115
Pistil 2-celled; red flowers in an umbel	*Clintonia*,	119

BOTANY

OF

WEST-CENTRAL CALIFORNIA.

SERIES I.

FLOWERING OR PHÆNOGAMOUS PLANTS.

Plants producing flowers and seeds; the former consisting, at least, of stamens and pistils, which may be together in the same flower, or they may separately form staminate and pistillate flowers growing on the same individual, or different individuals of one species; the latter containing a germ, or embryo.

CLASS I.—EXOGENS OR DICOTYLEDONS.

Stems consisting of pith in the center, bark on the outside, and between these, fibrous or woody tissue, which, in perennial stems, increases from year to year by the addition of layers on the outside next the bark. Embryo usually of two opposite cotyledons, or rarely with several in a whorl.

SUB-CLASS I.—ANGIOSPERMS.

Pistil consisting of a closed ovary which forms the fruit. Cotyledons two.

DIVISION I. POLYPETALÆ.

ORDER 1. RANUNCULACEÆ.

Herbs or shrubs, with colorless juice; foliage various; stipules none; organs of the flower free and distinct; sepals, petals, and pistils few or many; stamens numerous; petals sometimes wanting, then the sepals are usually petaloid; anthers short and adnate; seeds with minute embryos in fleshy albumen.

* *Flowers regular.*

Petals none; shrubby climbers..........Clematis. 1
Petals none; small herbs..........Anemone. 2
Petals 5 or more; carpels numerous..........Ranunculus. 3
Petals 5, spurred; carpels 5..........Aquilegia. 4

* * *Flowers irregular; colored sepals conspicuous.*

Upper sepal spurred..........Delphinium. 5
Upper sepal hooded..........Aconitum. 6

* * * *Sepals large, leaf-like, persistent.*

Flowers large..........Pæonia. 7

1. CLEMATIS, L. VIRGIN'S BOWER.

Sepals 4, colored and petal-like, valvate in the bud. Pistils numerous; styles persistent, becoming long feathery tails in fruit. Half-woody climbers or perennial herbs, with opposite leaves.

1. **C. ligusticifolia**, Nutt. Stems climbing by the petioles of the 5-foliolate leaves; leaflets broadly ovate to lanceolate, 1½ to 3 inches long, acute or acuminate, 3-lobed and coarsely toothed, rarely entire or 3-parted. Flowers diœcious, paniculate; sepals thin, silky, white, 4 to 6 lines long; akenes pubescent; tails 1 to 2 inches long.

Var. **Californica**, Watson. Leaves silky-tomentose beneath, often small.

2. **C. lasiantha**, Nutt. Leaves 3-foliolate; leaflets ovate, 1 to 1½ inches long, acute, coarsely toothed or 3-lobed or the terminal 3-parted. Flowers solitary on 1–2-bracted peduncles; sepals obtuse, thick, 6 to 10 lines long.

2. ANEMONE, L.

Sepals 4 to 20, colored and petal-like, imbricated in the bud. Petals none. Pistils numerous; style short; stigma lateral; akenes compressed, pointed, in a head. Erect perennial herbs, with lobed or divided leaves, which are radical, except those which form an involucre below the flower.

1. **A. nemorosa**, L. (WOOD ANEMONE.) Smooth or somewhat villous; stems from a slender rootstock, 3 to 12 inches high, without radical leaves, one-flowered; involucre of 3 petioled ternate leaves, the divisions cuneate-oblong to ovate, incisely toothed or lobed, or the lateral ones 2-parted, about an inch long; the 4 to 7 sepals pinkish or white; akenes 12 to 20, oblong, with a hooked beak.

Here belongs *Thalictrum Fendleri*, Englm. A smooth apetalous diœcious herb; also, *Myosurus minimus*, L. A very small herb, with a tuft of linear or spatulate entire radical leaves, and solitary flowers on simple scapes; called *Mouse-tail*, from its long, narrow receptacle, densely covered with small akenes.

3. RANUNCULUS, L. BUTTERCUP.

Sepals usually 5. Petals 3 to 18. Pistils numerous. Akenes in a head, usually flattened, beaked with the persistent style.

§ 1. *Aquatic herbs; petals white, with a pit at the base, the claw yellow; akenes transversely wrinkled.*

1. **R. hederaceus**, L., var. Glabrous; stems 6 to 12 inches long, floating; leaves commonly all floating, 3 to 8 lines wide, deeply 3-lobed, truncate or cordate at the base; the lobes equal, oval or oblong, the lateral ones usually with a broad notch in the apex; submersed leaves none or rudimentary and resembling adventitious roots; peduncles opposite the upper leaves, thicker than the petiole, 6 to 8 lines long; sepals a line long; petals 2 lines long, obovate oblong; stamens 5 to 9; akenes 4 to 6.

2. **R. aquatilis**, L., var. **tricophyllus**, Chaix. Stems long, filiform; leaves all submersed and cut into numerous capillary segments, which are 4 to 10 lines long; flowers 3 to 5 lines in diameter; akenes numerous in a globular head.

§ 2. *Terrestrial herbs, but often growing in wet places; sepals green; petals yellow, with a scale at the base; akenes neither wrinkled nor hispid.*

* *All the leaves undivided, the margins entire.*

3. **R. Flammula**, L., var. **reptans**, Gr. Glabrous throughout; stems filiform, creeping and rooting at the joints, 4 to 10 inches long; leaves mostly lanceolate and acute at each end, entire; flowers 2 to 5 lines in diameter; petals broadly obovate, one half longer than the sepals; akenes few, in a small globular head, plump, smooth; beak very short and curved.

4. **R. alismæfolius**, Geyer. Similar to the last species, but with stoutish, erect stems, longer flowers and obtuse leaves; akenes straight-beaked.

* * *Some or all the leaves ternately compound.*

5. **R. Californicus**, Benth. More or less hairy; stems erect, or nearly so, 12 to 18 inches high; radical leaves, commonly pinnately ternate, the leaves laciniately cut into 3 to 7 parts, which are usually linear; flowers bright yellow, 5 to 10 lines in diameter;

petals 10 to 14, narrowly obovate; sepals shorter than the petals, reflexed; akenes nearly 2 lines long, flat, with sharp edges; beak short and curved; heads compact, ovate or globular.

This is by far the most common species, and usually the only one collected by beginners. It varies greatly. The leaves are sometimes simply three lobed and sometimes much cut up. [*R. Bloomeri*, Wat., belongs here. See p. 122.]

6. **R. macranthus**, Scheele. Stems stout, 2 to 5 ft. high; flowers 14 to 18 lines in diameter; petals commonly 5 or 6, broadly obovate, shining yellow.

§ 3. *Akenes rough; otherwise as in* § 2.

7. **R. hebecarpus**, Hook. & Arn. Rather slender, more or less hairy; flowers minute; petals 5, not more than a line long; sepals hairy, about equaling the petals.

8. **R. muricatus**, L. Smooth; flowers 5 or more lines in diameter; akenes large and rough, with recurved beaks. Introduced from Europe.

4. AQUILEGIA, Tourn. COLUMBINE.

Sepals 5, regular, colored and petal-like; petals 5, produced backward (upward) into a long tubular spur; stamens numerous, exserted, the inner ones reduced to thin scales; pistils 5; styles slender. Flowers nodding, showy, terminating the branches.

1. **A. truncata**, Fisch. & Mey. Stems 1 to 3 ft. high; flowers usually red, tinged with orange or yellow; leaves usually ternately compound, leaflets lobed.

5. DELPHINIUM, Tourn. LARKSPUR.

Sepals 5, colored and petal-like, very irregular, the upper one prolonged backwards at the base into a long spur, which (in our species) contains spur-like prolongations of the upper pair of petals. Petals 4, small and irregular. Stamens many. Pistils 1 to 5. Erect herbs, with palmately-cleft, lobed, or dissected leaves, and racemose flowers.

1. **D. simplex**, Dougl. Canescent throughout, with a fine, short, somewhat woolly pubescence, rarely smooth; stem stout and strict, 1 to 3 ft. high, leafy; leaves all much dissected with linear obtuse lobes, on stout, erect petioles; racemes usually dense and many-flowered, the pedicels often short and nearly erect; flowers small, blue, varying to nearly white or yellowish; sepals 4 or 5 lines long, about equaling the stout, straight spur; ovaries and capsule pubescent.

2. **D. variegatum**, Torr. & Gr. Foliage similar to the last, but the flowers much larger, on longer pedicels, forming a short, open raceme; ovary and capsule pubescent.

3. **D. decorum**. Fisch. & May. Lower leaves 5-lobed, sparingly toothed, the upper with narrow divisions. Flowers similar to the last, but the spur is usually longer, and the ovary and capsule smooth.

4. **D. Californicum**, Torr. & Gr. Stems stout, 2 to 7 ft. high; leaves large, 3 to

5 cleft, the divisions variously lobed; pedicels and dull bluish flowers densely velvety pubescent.

D. nudicaule, Torr. & Gr. Distinguished by its red flowers.

6. ACONITUM, Tourn. MONKSHOOD.

Sepals 5, colored and petal-like, very irregular; the upper one arched into a hood or helmet, which conceals the spur-like blades of the upper pair of petals. General appearance similar to *Delphinium*.

1. **A. Columbianum**, Nutt. Sufficiently characterized by the generic description. Rare.

7. PÆONIA, L.

Sepals 5, herbaceous. Petals 5 to 10. Stamens inserted on a fleshy disk. Pistils 2 to 5. Fruit leathery follicles. Perennial herbs with compound leaves.

1. **P. Brownii**, Dougl. Leaves thick, 1–2-ternately compound, the leaflets ternately and pinnately lobed, glaucous; petals leathery, dull, dark red, about equaling the sepals.

ORDER 2. BERBERIDACEÆ.

Shrubs or herbs, with compound alternate exstipulate leaves; flowers remarkable for having the bracts, sepals, petals and stamens before each other, instead of alternating.

Low shrubs, with rigid pinnate leaves and small yellow flowers...........**Berberis.** 1
A fern-like herb, with white flowers...............................**Vancouveria.** 2

1. BERBERIS, L. BARBERRY.

Sepals, petals, and stamens 6 each, with 3 or 6 bractlets. Carpel 1, forming a berry. Smooth shrubs, with yellow wood, and yellow flowers in bracteate racemes.

* *Leaflets pinnately veined.*

1. **B. repens**, Lindl. Less than a foot high; leaflets 3 to 7, ovate, acute, 1 to 2½ inches long, not shiny above; short racemes terminating the stems.
2. **B. Aquifolium**, Pursh. 2 to 4 ft. high; leaflets 7 or more, the lower pair distant from the stem, 1½ to 4 inches long, shining above, spiny; racemes chiefly clustered in subterminal axils.
3. **B. pinnata**, Lag. Like the last species, but the leaves more crowded, and the lower pair of leaflets near the base of the petiole; usually 5 to 7 leaflets.

* * *Leaflets palmately nerved.*

4. **B. nervosa**, Pursh. Simple stems but a few inches high; leaves 1 to 2 ft. long, of 11 to 17 leaflets.

2. VANCOUVERIA, Morren & Decaisne.

Sepals and petals 6 each, reflexed, with 6 to 9 bractlets. Stamens 6. Carpel 1; the stigma cup-shaped. A slender perennial herb, with radical 2–3-ternately compound leaves, and the open paniculate raceme upon a naked scape.

V. hexandra, Morr. & Dec. The long petioled leaves rising like the fronds of a fern, leaflets 1 to 2 inches broad, petiolulate, obtusely 3-lobed, the margin thickened; the minute flowers on a scape exceeding the leaves.

ORDER 3. NYMPHÆACEÆ.

Aquatic perennial herbs, with peltate or deeply cordate leaves; solitary axillary perfect flowers on long peduncles. Stamens numerous.

Water-Shield. (*Brasenia peltata*, Pursh.) May be found in ponds. Its elliptical, peltate, floating leaves (green above and brownish-red beneath) and its jelly-coated stems characterize it quite well enough.

The *Yellow Pond-Lily* (*Nuphar polysepalum*, Engl.) is more common.

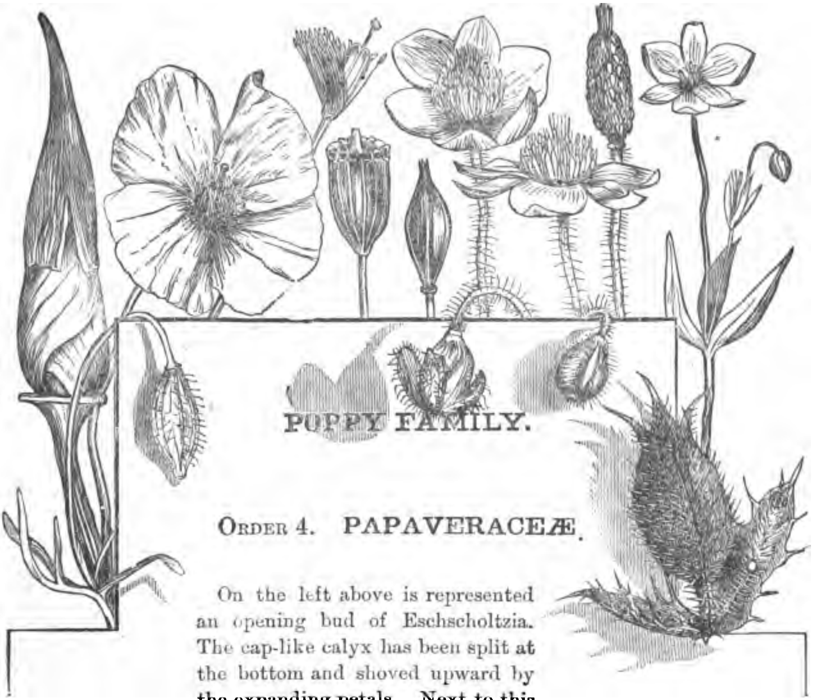
The Order **Sarraceniaceæ** is represented by the remarkable *Darlingtonia Californica*, or California Pitcher Plant, which grows in cold swamps in the northern part of the State, from Mount Shasta to near the coast.

Frankenia grandifolia grows in saline soils, and may be known by its opposite sessile, obovate, or linear oblanceolate, small leaves, with revolute margins; and by its small, pink flowers. It may be distinguished from a Silene, which at first it seems to be, by its fewer (4 to 7) stamens and sessile flowers.

The Order **Frankeniaceæ** should come next to *Caryophyllaceæ*. *Fremontia Californica*, belonging to the Order **Sterculiaceæ**, which is allied to the **Malvaceæ**, is most conveniently described here also. It is a small tree, bearing conspicuous yellow flowers in the axils of usually broadly cordate, lobed leaves. The apetalous flowers are sometimes 2 or 3 inches across.

The Order **Capparidaceæ** is represented in Santa Barbara County, and southward, by *Isomeris arborea*, a low shrub, bearing bracteate racemes of yellow flowers, the pistils conspicuous on account of their long stipes. The flowers of this plant are apparently like those of the Cruciferæ, and its proper place is next to that order. Capers are obtained from a cultivated plant of this order.

The Order **Styracaceæ** is represented by *Styrax Californica*, a pretty shrub, bearing clusters of nearly rotate white flowers, in which the gamopetalous corolla is cut down to the short tube which is adnate to the tube formed by the stamens: Calyx truncate



POPPY FAMILY.

ORDER 4. PAPAVERACEÆ.

On the left above is represented an opening bud of Eschscholtzia. The cap-like calyx has been split at the bottom and shoved upward by the expanding petals. Next to this bud is an open flower of Meconopsis and one of its nodding buds. Behind the flower, and projecting above it to the right, is a stem from which the petals have just fallen. The slender filaments bending to one side, as they often do, show the curious pistil which in time becomes the pretty fluted capsule seen below. To the right of the Meconopsis pod is the three-sided capsule of Platystigma lineare. The stem should have a few hairs upon it. The two flowers with hairy stems, the nodding buds below, and the rough seed pod above, belong to Platystemon. Observe the three caducous sepals, just ready to drop from the opening bud. The smooth plant on the right is Platystigma Californicum. If you choose you may call this the Smooth Platystigma, and the other species, with the triangular pod, Hairy Platystigma. The exceedingly prickly Bristly Argemone is represented on the right, below, by a bud and a couple of bracts. A pistil with its white prickles is imperfectly shown against one of the bracts.

The Order **Papaveraceæ** is characterized by flowers with 2 or 3 caducous sepals, twice as many free petals in two sets, indefinite, usually numerous, free stamens, and a compound pistil. In *Eschscholtzia* the sepals are united, and the stamens adhere to the claws of the petals.

This small but interesting order of plants, with the exception of one species, is confined to the northern hemisphere. Fifteen species, belonging to eleven genera, are natives of the United States, and several European species have become naturalized. Eschscholtzia and Platystemon are the most widely distributed of the California genera.

Romneya Coulteri is a half shrubby plant, with smooth pinnatifid leaves and very large white flowers (3, 4, or even 6 inches across), a native of the coast from San Diego to Santa Barbara County.

Arctomecon is another white-flowered plant, with somewhat hairy, nearly entire leaves; the petals persistent; found in south Nevada and Utah.

Canbya, a recently discovered plant of south-east California, is the smallest of the order, being scarcely an inch in height. The small white petals are persistent.

Papaver Somniferum, a native of Asia, furnishes opium, which is the dried juice of the plant. A variety of this species is cultivated in this State for the seeds, from which is expressed poppy oil, used by artists. This oil is also used as a substitute for olive oil in the preparation of salads, etc.

* *Herbs with entire leaves, the uppermost whorled or opposite, sepals 3.*

Filiform stigmas 6 to many (pistil hollow)........................**Platystemon.** 1
Flat stigmas 3..**Platystigma.** 2

* * *Herbs with divided or lobed leaves.*

Slightly lobed stigma, style distinct; sepals 2.......................**Meconopsis.** 3
Filiform stigmas unequal; sepals united to form a conical cap.......**Eschscholtzia.** 4
Entire plant bristly with prickles; sepals 3, each with a horn..........**Argemone.** 1a

* * * *Shrub with entire leaves.*

Buds globular; stigmas 2...**Dendromecon.** 5

1a. ARGEMONE, L.

Sepals 2 or 3, spinosely beaked. Petals 4 or 6. Stamens numerous, with linear anthers. Leaves sinuately pinnatifid, prickly toothed.

1. **A. hispida**, Gr. (Chicalote). Erect, armed with rigid bristles and prickles; leaves 3 to 6 inches long; flowers, nearly white, 2 to 4 inches in diameter; capsule 1½ inches long.

1. PLATYSTEMON, Benth. CREAM-CUPS.

Sepals 3. Petals 6. Stamens many, with flattened filaments and linear anthers. Torulose carpels at first united; stigmas free.

1. **P. Californicus**, Benth. Slender, branching, 6 to 12 inches high; villous, with spreading hairs; leaves 2 to 4 inches long, sessile or clasping, broadly linear, obtuse,

pale-green. Sepals hairy; petals pale-yellow, shading to orange in the center, 3 to 6 lines long.

2. PLATYSTIGMA, Benth.

Sepals 3. Petals 4 to 6. Stamens few or many, with narrow filaments. Ovary 3-angled, oblong or linear; stigmas 3, ovate to linear. Low, slender annuals, resembling *Platystemon* in habit, with pale-green, entire, opposite or verticillate leaves and long-peduncled pale-yellow or creamy-white flowers.

1. **P. lineare**, Benth. Hairy, short-stemmed; stamens many, with dilated filaments; stigmas broad; capsule ovate.

2. **P. Californicum**, Benth. & Hook. Smooth, long-stemmed; stamens few (10 to 12) with filiform filaments; stigmas narrow; capsule linear.

3. MECONOPSIS, Viguier.

Sepals 2. Petals 4. Stamens numerous, with filiform filaments and oblong anthers. Style distinct; stigma 4–8-lobed. Seeds numerous.

1. **M. heterophylla**, Benth. Annual, smooth, slender, 1 to 2 ft. high; lower leaves long petioled, pinnately divided, the segments oval to linear and 2 to 12 lines long; upper leaves sessile; flowers scarlet to orange, the petals 2 to 12 lines long; peduncles elongated. Very variable.

4. ESCHSCHOLTZIA, Chamisso.

Sepals coherent into a narrow pointed hood, which drops off from the top shaped torus when the flower opens. Petals 4. Stamens numerous, with short filaments and long anthers. Smooth annuals, with colorless, bitter juice; finely dissected, pale-green alternate petioled leaves, and bright orange or yellow (rarely white) flowers.

1. **E. Californica**, Cham. Has stout branching stems, 1 to 1½ ft. high; flowers 2 to 4 inches in diameter, brilliant orange toward the center; capsule 2½ inches long, curved.

Var. **Douglasii**, Gr. More slender; flowers yellow.

Var. **cæspitosa**, Brewer. Scape-like peduncles; small yellow flowers.

5. DENDROMECON, Benth.

Sepals 2. Petals 4. Stamens numerous, with short filaments and linear anthers. Ovary linear; style short; stigmas 2, short and erect. The many seeded capsule dehiscent the whole length by 2 valves separating from the placental ribs. A smooth branching shrub, with alternate vertical entire thick and rigid leaves and showy yellow flowers. The only true woody plant belonging to the order.

1. **D. rigidum**, Benth. A shrub 2 to 8 ft. high, with slender branches and whitish bark; leaves ovate to linear-lanceolate, 1 to 3 inches long, very acute or mucronate, sessile or nearly so, twisted into a vertical position, margin rough or denticulate.

ORDER 5. FUMARIACEÆ.

Tender herbs with dissected compound leaves, and irregular hypogynous flowers, the parts in twos, except the 6 diadelphous stamens.

1. DICENTRA, Borkh.

Sepals 2, small and scale-like, sometimes caducous. Corolla of two pairs of petals, flattened and cordate; the outer pair the larger and sacked at the base, the tips spreading; the inner, spoon-shaped, lightly united at the apex, inclosing the anthers and stigma. Stamens in two sets, 3 before each of the outer petals, filaments slightly cohering. Style slender; stigma 2-lobed, each lobe sometimes 2-crested.

1. **D. formosa**, DC. Leaves radical, and the compound racemes of rose-colored flowers borne on naked scapes.

2. **D. chrysantha**, Hook. & Arn. The flowers in long terminal paniculate racemes on leafy stems; corolla narrow, scarcely cordate, golden yellow.

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ORDER 6. CRUCIFERÆ.

Herbs with pungent watery juice. Sepals 4. Petals 4, with blade narrowed into a claw, the lamina spreading to form a cross, rarely wanting. Stamens 6, two of them inserted lower down on the receptacle and shorter than the other four. Ovary 2-celled by a thin partition, rarely 1-celled. Leaves alternate, and flowers usually in racemes without bracts.

Since a careful examination of the fruit is usually necessary for the determination of species in this difficult order, only such plants as have large flowers or remarkable fruit are here described.

§ 1. *Pod dehiscent, 2-valved.*

* *Pod elongated, compressed parallel with the partition; seeds flat.*

Petioled leaves, lobed or divided; root tuberous	**Cardamine.**	1
Stem leaves sessile, entire; root perpendicular.		
Flowers purple	**Arabis.**	2
Flowers orange	**Cheiranthus.**	3
Flowers yellowish	**Erysimum.**	4

* * *Pod terete; seeds globose.*

Flowers Yellow	**Brassica.**	5

* * * *Pod flattened contrary to the partition.*

Pod linear; flowers axillary, yellow	**Tropidocarpum.**	6
Pod obcordate; flowers minute	**Capsella.**	7
Pod obovate, 2-winged at the top	**Lepidium.**	8

§ 2. *Pod indehiscent, 1-celled.*

Pod orbicular, winged with a thin broad margin; flowers minute...	**Thysanocarpus.**	9
Pod long, pithy; seeds large; flowers large, veiny..................	**Raphanus.**	10

1. CARDAMINE, L.

Pod linear, with somewhat thickened margins, merely pointed or beaked above; valves flat, nerveless. Seeds in one row somewhat flattened, wingless; cotyledons flat, accumbent. Sepals equal. Petals white or pinkish.

1. **C. paucisecta**, Benth. Stems from small deep-seated tubers, erect, 8 to 18 inches high; leaves various; the upper deeply lobed or parted, the lower often simple; petals 6 to 9 lines long; pods 1 to 1½ inches long.

2. ARABIS. L.

Pod linear; valves 1-nerved, not strongly. Seeds in 1 or 2 rows, flattened; cotyledons accumbent. Sepals short or narrow, rarely colored. Petals with a narrow claw, white, rose-colored, or purple.

1. **A. blepharophylla**, Hook. & Arn. Stems often tufted 4 to 12 inches high; leaves strongly ciliate, sometimes sparingly sinuate-toothed, the lower obovate or broadly spatulate, the cauline oblong, sessile; petals bright purple, 6 to 9 lines long.

2. **A. Breweri**, Wat. Cespitose, canescent, with dense stellate pubescence; stems 2 to 10 inches high; petals 1 to 4 lines long, deep rose-color; sepals purplish; pods spreading or recurved.

3. CHEIRANTHUS, L.

Pod elongated, compressed; valves 1-nerved or carinate. Seeds in one row, flattened, not winged; cotyledons accumbent, or rarely oblique. Calyx not colored, the outer sepals strongly gibbous. Stigma with two spreading lobes.

1. **C. asper**, Cham. & Sch. Rather sparingly pubescent with appressed 2-parted hairs; stem simple erect, leafy, 1 to 3 ft. high; leaves spatulate or oblanceolate, the lower long petioled, entire or sinuate-toothed; sepals broad 4 to 6 lines long, half the length of the bright yellow or orange petals; pods 1½ to 2 inches long.

4. ERYSIMUM, L.

Pod 4-angled by the prominent mid-nerve of the valves, not stipitate; cotyledons incumbent or oblique. Sepals, petals and stigma like the last.

1. **E. asperum**, DC. Similar to the last; sepals narrower; petals usually creamy white to yellow.

5. BRASSICA, L. MUSTARD.

Pod nearly terete or somewhat 4-sided, pointed with a long conical beak. Seeds in one row globose; cotyledons infolding the radical. Lateral sepals usually gibbous. Petals yellow.

1. **B. campestris**, L. Smooth; lower leaves pinnately divided, with a large terminal lobe; the upper leaves oblong or lanceolate, with a broad clasping base; pods 2 inches long or more.

2. **B. nigra**, Boiss. Larger; leaves all petioled; pods less than an inch long.

Not to be confounded with **Sisymbrium officinale**, Scop., which has runcinately pinnatifid leaves, small yellow flowers and closely appressed, subulate sessile pods half an inch long; or, with **S. acutangulum**, DC., similar to the last, but the pods on short pedicels, erect and over an inch long. The last are called *Hedge Mustards.*

6. TROPIDOCARPUM, Hook

Pod linear, flattened, often 1-celled by the disappearance of the narrow partition. Seeds in two rows, minute; cotyledons incumbent. A low hirsute branching annual, with pinnately divided leaves, and yellow, solitary axillary flowers.

1. **T. gracile**, Hook. Stems weak; petals 1½ to 3 lines long, broad; pods 6 to 20 lines long, pointed at both ends.

7. CAPSELLA, Mœnch. SHEPHERD'S PURSE.

Pod obcordate, much flattened, many-seeded; cotyledons incumbent. Slender and mostly smooth annuals, with minute flowers.

1. **C. Bursa-pastoris**, Mœnch. Somewhat hirsute at base; radical leaves mostly runcinate-pinnatifid, the cauline lanceolate, clasping.

2. **C. divaricata**, Walp. Very slender; pods elliptic-oblong; is more rare.

8. LEPIDIUM, L. PEPPERGRASS.

Pod orbicular or obovate, emarginately 2-winged at the summit; the cells 1-seeded. Low herbs, with pinnatifid or toothed leaves, and small white flowers; the petals in some species wanting, and the stamens only 2 or 4.

1. **L. latipes**, Hook. Stems stout, simple 1 to 3 inches high, surpassed by the irregularly and coarsely pinnatifid leaves; racemes capitate, in fruit an inch long or less; sepals very unequal; pod strongly reticulated, the acute wings nearly as long.

2. **L. oxycarpum**, Torr. & Gr. Stems simple or branched 3 to 6 inches high; smooth; raceme lax, elongated; pod smooth, rounded, nodding, the broad acute teeth short and divergent; petals none.

3. **L. nitidum**, Nutt. Similar to the last, but larger; petals present; pods smooth and shining, acutely margined.

4. **L. Menziesii**, DC. Hispid; petals none; pods not margined, except by the very short teeth at the summit.

Var. (?) **strictum**, Wat. Sepals green, persistent; fruiting racemes crowded cylindric-capitate, the pedicels erect, low and spreading. This plant seems to be a separate species. It has been found in San Francisco, by *Miss Annie Hughes.*

9. THYSANOCARPUS, Hook.

Pod 1-celled, 1-seeded, plano-convex, mostly pendulous on slender pedicels. Flowers minute, white or rose-colored.

1. **T. curvipes**, Hook. Six inches to two feet high; the upper leaves clasping by a broad auricled base; pods densely tomentose or smooth, 2 to 4 lines in diameter, the wing entire or crenate, veined and often perforate, emarginate at the top and tipped with the purple style. The perforate-wing form called *Lace-pod.*
2. **T. laciniatus**, Nutt. Smaller and more slender; the cauline leaves scarcely auricled at the base; pods obovate, cuneate at the base, 2 to 3 lines long.

Var. **crenatus**, Brewer. The broader wing deeply crenate or fringed. *Fringe-pod.*

3. **T. radians**, Benth. Pods round, 4 to 5 lines in diameter, scarcely emarginate, with a broad entire translucent wing conspicuously marked by radiating nerves.
4. **T. pusillus**, Hook. May be known by its minute pods hirsute with hooked hairs.

10. RAPHANUS, L. RADISH.

Coarse introduced annuals.

1. **R. sativus**, L., has a pointed 2-seeded pod.
2. **R. Raphanistrum**, L., has a necklace-shaped pod, long beaked, 1–9-seeded.

ORDER 7. CISTACEÆ.

Flowers perfect and regular. Sepals 5, persistent; and two of them smaller, wholly exterior, and bract-like. Petals 5, usually ephemeral. Stamens indefinite, with filiform filaments; anthers short. Style one. Capsule 3-valved.

1. HELIANTHEMUM, Tourn.

Petals broad. Stamens numerous (about 20). Style short; stigma 3-lobed. Low branching herbs, or somewhat woody; flowers yellow, opening only once, in sunshine.

1. **H. scoparium**, Nutt. Much branched, hairy or smooth, about a foot high; leaves narrow, 4 to 12 lines long, alternate; flowers on slender pedicels, one or several terminating the branches; petals 4 lines long.

ORDER 8. VIOLACEÆ.

Herbs distinguished by the irregular one-spurred corolla of 5 petals, 5 stamens, adnate introrse anthers conniving over the pistil, which has a club-shaped style with a one sided

stigma, a one celled ovary, forming a capsule, which splits at maturity into three parts. Represented only by the familiar genus

1. VIOLA, L.

Sepals unequal, auricled at the base. Petals unequal, lower one spurred. Anthers nearly sessile, often coherent, the connectives of the two lower bearing spurs which are inclosed by the spur of the petal. (See ADDENDA.)

* *Leaves undivided.*

+ *Flowers not yellow, or orange.*

1. **V. canina**, L., var. **adunca**, Gr. Flowers violet or purple. Low stems sending out runners; leaves ovate, often somewhat cordate at the base, obscurely crenate; stipules foliaceous, narrowly lanceolate, lacerately toothed; spur as long as the sepals, curved; lateral petals bearded.

Var. **longipes**, Wat. The obtuse spur straight.

2. **V. ocellata**, Torr. & Gr. Stems nearly erect, 6 to 12 inches high; leaves cordate to cordate-ovate, acutish, conspicuously crenate; stipules small, scarious; upper petals white within, purple-brown without, the others pale-yellow veined with purple.

++ *Flowers yellow, tinged with purple.*

3. **V. pedunculata**, Torr. & Gr. Stems with a decumbent or procumbent base; leaves rombic-cordate, with truncate or abruptly cuneate base, obtuse, coarsely crenate; stipules foliaceous, narrowly lanceolate, entire or gashed; showy flowers on peduncles exceeding the leaves; petals 6 to 9 lines long, the upper tinged with brown on the outside, the others veined with deep purple; lateral petals bearded; capsule smooth.

4. **V. aurea**, Kellogg. Leaves ovate to lanceolate, cuneate or sometimes truncate at base, obtuse, coarsely crenate; stipules foliaceous, lanceolate, laciniate; peduncle but little longer than the leaves; petals 4 to 6 lines long, as in the last, but lighter yellow; capsule pubescent.

5. **V. Nuttallii**, Pursh. Leaves oblong-ovate to oblong, attenuate into a long petiole, entire, or obscurely sinuate; stipules entire; peduncles usually shorter than the leaves.

+++ *Flowers yellow.*

6. **V. sarmentosa**, Dougl. Leaves rounded-cordate, reniform, or sometimes ovate, finely crenate, usually punctate with dark dots. Flowers small.

* * *Leaves divided or lobed; flowers yellow, tinged with brown-purple.*

7. **V. lobata**, Benth. Distinguished by its stout stems and large palmately 5 to 9-lobed leaves. Flowers large.

8. **V. chrysantha**, Hook. Stems short; leaves bipinnatifid, with narrow segments. Flowers large, like **V. pedunculata**, but the lateral petals are not bearded.

ORDER 9. POLYGALACEÆ.

Herbs or shrubs, with simple entire exstipulate leaves, remarkable for the papilionaceous-looking flowers. In our genus the ovary is 2-celled.

1. POLYGALA, Tourn.

Sepals 5, very unequal, the 2 lateral ones large and petal-like. Petals 3, united to each other and to the stamen-tube, the middle one hooded and often crested or beaked. Stamens 6 to 8, the filaments united below into a split sheath, adnate at the base to the petals. The 2-celled ovary forms a capsule flattened contrary to the partition, notched or retuse above.

1. **P. cucullata**, Benth. Stems slender from a woody base, 2 to 8 inches high; leaves smooth, oblong-lanceolate or ovate-elliptical, ½ to 1 inch long, short petioled; flowers rose-color; outer sepals 2½ lines long, rounded-saccate at the base; the wings broadly spatulate, 4 to 6 lines long.
2. **P. Californica**, Nutt. Stouter; flowers greenish white.

ORDER 10. CARYOPHYLLACEÆ.

Herbs with regular and mostly perfect flowers, persistent calyx, its parts and the petals 4 or 5 and imbricated or the latter sometimes convolute in the bud, the distinct stamens commonly twice as many as the petals, ovary 1-celled with a free central placenta. Stems usually swollen at the nodes. Leaves opposite, often united at the base by a transverse line, in one group with interposed scarious stipules. Styles 2 to 5, mostly distinct. Fruit a capsule opening by valves, or by teeth at the summit. Flowers terminal, or in the forks, or in cymes.

Many species in this order are difficult to determine.

** Sepals united into a 4–5-toothed calyx. Petals long-clawed.*		
Petals with bifid appendages	**Silene.**	1
** * Sepals distinct; petals without claws.*		
Petals bifid; capsule cylindric	**Cerastium.**	2
Petals bifid capsule globose	**Stellaria.**	3
Petals entire; capsule globose	**Arenaria.**	4
Stipules present; styles 5	**Spergula.**	5
Stipules present; styles 3	**Lepigonum.**	6

1. SILENE, L.

Calyx tubular, cylindrical to campanulate, 5-toothed, 10-nerved. Petals 5, with narrow claws; the blade mostly bifid or many-cleft and usually crowned with 2 scales at the base. Stamens 10; styles 3, erect. Capsule dehiscent by 6, rarely 3 teeth.

1. **S. Gallica**, L. Hairy; leaves spatulate, 1 to 1½ inches long; calyx oblong-cylindric, becoming expanded by the growth of the ovoid capsule; flowers small, rose-colored, in one-sided close racemes; petals entire, slightly twisted.

2. **S. Californica**, Durand. Glandular-pubescent; stems 6 inches to 3 ft. high, lax, leafy; flowers large, deep scarlet, few at the ends of the branches; calyx 7 to 10 lines long; petals deeply parted with bifid segments, the lobes 2–3-toothed or entire, with often a lateral one.

3. **S. Douglasii**, Hook. Stems simple few-flowered; leaves narrowly oblanceolate to linear, an inch or two long; calyx oblong-cylindric, often inflated, 5 to 7 lines long; petals rose-color or nearly white; 8 to 10 lines long, bifid with broad obtuse lobes; claw broadly auricled; capsule oblong-ovate, long stiped.

2. CERASTIUM, L. MOUSE-EAR CHICKWEED.

Sepals 5. Petals 5, emarginate or bifid. Stamens 10. Styles 5, rarely less. The curved capsule dehiscing by twice as many teeth as there are styles. Flowers white.

1. **C. pilosum**, Ledeb. Erect, rather stout, more or less densely pilose; leaves oblong-lanceolate, ½ to an inch or more long, acute, almost sheathing at the base; flowers from ½ to 1 inch in diameter.

C. ARVENSE, L., has downy acute leaves.

C. VULGATUM, L., has ovate or obovate obtuse leaves; flowers clustered.

3. STELLARIA, L. CHICKWEED.

Sepals 5, rarely 4. Petals as many, 2-cleft. Stamens 10, or fewer by abortion. Low herbs with minute white flowers and 4-angled stems.

1. **S. media**, L. Weak and spreading, rooting at the lower joints; the ovate leaves less than an inch long on hairy petioles, or the upper ones sessile; stamens 3 to 10.

Introduced from Europe.

2. **S. nitens**. Nutt., has small sessile lanceolate leaves and narrow shining sepals surpassing the minute petals.

3. **S. littoralis**, Torr., is rather a stout hairy plant, with ovate leaves; flowers in a terminal cyme. May be found on the sea-shore.

4. ARENARIA, L. SANDWORT.

Distinguished chiefly from *Stellaria* by the entire petals and usually by the tufted stems and subulate rigid leaves. In our species the 3 valves of the capsule are entire; bracts foliaceous.

1. **A. Douglasii**, Torr. & Gr. Slender, much branched, 3 to 6 inches high; leaves

filiform, 3 to 12 lines long; flowers on long slender pedicels; sepals 3-nerved; petals obovate, 2 lines long or more; longer than the sepals.

2. **A. Californica**, Brew. Leaves lanceolate, 1 or 2 lines long; flowers smaller than the last; petals spatulate.

3. **A. palustris**, Wat. Stems weak, 4 to 8 inches high; leaves linear, flaccid, 6 to 12 lines long; flowers few on long pedicels; petals 3 or 4 lines long. In swamps.

5. SPERGULA, L. CORN-SPURRY.

Sepals 5. Petals 5, entire. Stamens 10, rarely 5. Ovary 1-celled, many-ovuled; styles 5, alternate with the sepals. Annuals dichotomously branched, with awl-shaped apparently whorled leaves (fascicled).

1. **S. arvensis**, L. The almost filiform leaves 1 or 2 inches long; flowers white, the long pedicels at length reflexed. Naturalized.

6. LEPIGONUM, Fries. SAND-SPURRY.

Sepals 5. Petals 5, entire, rarely fewer. Stamens 10, or fewer by abortion. Ovary 1-celled, many ovuled; styles 3, or rarely 5. Low herbs, with setaceous or linear fascicled leaves; flowers white or pink, pediceled.

1. **L. macrothecum**, Fisch. & Mey. Rather stout, often a foot high; leaves fleshy ½ to 2 inches long, with large ovate stipules; pedicels becoming reflexed; sepals 3 or more lines long, equaling the pinkish petals. In salt-marshes.

2. **L. medium**, Fries. More slender than the last, with smaller flowers on shorter pedicels.

ORDER 11. PORTULACACEÆ.

Succulent herbs, with simple and entire leaves, and regular but unsymmetrical perfect flowers; the sepals only 2, the petals 2 to 5 or more; the stamens opposite the petals when of the same number; the ovary 1-celled. Stamens sometimes indefinitely numerous, commonly adhering to the base of the petals, these sometimes united at the base. Style 2 to 8-cleft. Stipules none.

* *Sepals 2, distinct, persistent.*

Stamens more than 5 .... **Calandrinia.** 1
Stamens 5 .... **Claytonia.** 2
* * *Sepals 4 to 8* .... **Lewisia.** 3

1. CALANDRINIA, H B K.

Petals mostly 5 (3 to 10). Stamens 5 to 15. Ovary free, many-ovuled; style 3-cleft, short. Capsule globose or ovoid, 3-valved. Seeds shining-black. Low succulent herbs with alternate leaves.

1. **C. Menziesii**, Hook. Smooth, branching from the base, the stems ascending; leaves linear to oblanceolate, 1 to 3 inches long, the lower on slender petioles; sepals keeled, the calyx 4-angled in the bud; petals broadly obovate, red to purple, 2 to 6 lines long. One of the most abundant of open ground early flowers.

2. CLAYTONIA, L.

Petals 5, equal. Stamens 5. Style 3-cleft. Capsule and seeds as in *Calandrinia*. Radical leaves numerous; cauline perfoliate, or a pair.

1. **C. perfoliata**, Donn. Stems 2 to 12 inches high; radical leaves long-petioled, broadly rhomboidal, or deltoid, or deltoid-cordate, ½ to 3 inches broad, obtuse; the cauline pair usually united to form an almost orbicular perfoliate leaf, concave above; the lax raceme of small pinkish flowers nearly sessile in the leaf-cup.

Var. **parviflora**, Torr. Radical leaves linear, or linear-spatulate.

Var. **spathulata**, Torr. Radical leaves linear; the cauline pair distinct or partly united on one side, ovate to lanceolate. Low and slender.

Var. **exigua**, Torr. Low, radical leaves narrowly linear or filiform; the cauline distinct, linear.

2. **C. Siberica**, L. Stems 6 to 15 inches high; radical leaves lanceolate to rombic-ovate or nearly orbicular, long-petioled; the cauline pair ovate or varying from lanceolate to spatulate-obovate, sessile, distinct; raceme loose; the rose-colored or white petals 2 to 4 lines long.

3. LEWISIA, Pursh.

Petals 8 to 16, large and showy, rose-colored. Stamens numerous (40 or more). Style 3 to 8-parted nearly to the base. Low acaulescent fleshy perennials, with fusiform roots, and short 1-flowered scapes.

1. **L. rediviva**, Pursh. Leaves densely clustered, linear-oblong, subterete, 1 or 2 inches long, smooth and glaucous; scape jointed in the middle, bearing on the joint 5 to 7 subulate verticillate bracts; petals sometimes white, 8 to 16 lines long.

ORDER 12. HYPERICACEÆ.

Herbs or shrubs, with opposite entire punctate leaves, no stipules and perfect flowers with 4 or 5 petals and numerous stamens, the fruit a septicidal many-seeded capsule. Calyx of 4 or 5 persistent sepals. Filaments mostly in 3 sets. Styles 2 to 5, usually distinct.

1. HYPERICUM, L. ST. JOHN'S-WORT.

Sepals and petals 5. The numerous stamens in three bundles. Ovary 1 to 3-celled, the ovules growing on the parietal placentæ. Flowers cymose, yellow.

1. **H. Scouleri.** Hook. Stems erect from a running rootstock ½ to 2 feet high, terete, simple or sparingly branched; leaves ovate to oblong, clasping, an inch or less long; petals punctate, 3 to 5 lines long; capsule 3-celled.

2. **H. concinnum,** Benth. Stems from a woody base, 3 to 6 inches high; leaves from oblong to linear, acute, an inch long or less, not clasping, usually folded.

3. **H. anagalloides,** Cham & Schlecht. Stems numerous, weak, rooting at the lower joints, 1 to 10 inches long; leaves broadly ovate or elliptical, 2 to 6 inches long, obtuse, clasping; sepals exceeding the petals; capsule 1-celled.

ORDER 13. MALVACEÆ.

Herbs or shrubs with alternate stipulate leaves; distinguished by the valvate calyx, convolute petals, their bases or short claws united with the base of a column of many united stamens, these with reniform anthers. Calyx 5-cleft or parted, persistent, with sometimes a calyx-like involucel of bracts. Petals 5, usually withering without falling off. Pistil usually either a ring of ovaries around a projecting receptacle or a 3–10-celled ovary; styles united at least at the base. Leaves usually palmately ribbed. Flowers axillary. (See ADDENDA.)

1. LAVATERA, L. TREE MALLOW.

Involucel 3 to 6-cleft. Stamineal column divided into numerous filaments. Styles filiform. Fruit depressed; the several carpels separating from the prominent axis, 1-seeded.

1. **L. assurgentiflora,** Kellogg. A shrub 6 to 15 ft. high; flowers 1 to 4 in the axils on drooping pedicels; petals rose-purple, 1 to 1½ inches long, with a broad truncate limb and narrow claws having a pair of dense hairy tufts at the base. Commonly cultivated, but a native (?) of this State.

2. MALVA, L. MALLOW.

Involucel 3-leaved. Petals obcordate, small. Herbaceous. Otherwise as *Lavatera.*

M. borealis, Wallman. Annual; leaves round-cordate, crenate, 5–7-lobed; peduncles short; petals pinkish-white, 2 or 3 lines long.

Distinguished from the biennial *M. rotundifolia* by its short pedunceles, small flowers and rugose carpels.

3. SIDALCEA, GR.

Involucel none. Stamineal column double; the filaments of the outer series usually united into 5 sets, opposite the petals. Flowers in a terminal raceme or spike. Herbs.

**Perennial.*

1. **S. malvæflora,** Gr. Perennial, 1 to 3 ft. high; leaves on elongated petioles,

orbicular to semi-circular in outline; the lower toothed or cleft, the upper more narrowly and deeply, 5 to 9-lobed or parted; the segments sparingly toothed, often linear and entire; flowers in naked elongated racemes; bractlets small, lanceolate; pedicels short, naked; calyx often tomentose; petals emarginate, 6 to 12 lines long, purple; carpels smooth.

2. **S. humilis**, Gr. Much resembling the last, but lower, and often decumbent at the base; leaves smaller; flowers fewer and more scattered; calyx larger, 3 to 6 lines long; carpels reticulated and pubescent.

* * *Annual.*

3. **S. diploscypha**, Gr. Pubescent with long spreading hairs, 1 to 2 ft. high; leaves deeply 5–9-cleft with lobed segments; bractlets conspicuous, 5 to 7-parted, hispid; flowers nearly sessile in close 3 to 5-flowered clusters; petals 6 to 12 lines long, broad and emarginate.

4. **S. malachroides**, Gr. Stout, hirsute, 3 to 6 ft. high, tufted; leaves large; flowers small, white or purplish, nearly sessile in close terminal heads on the short leafy branches; petals narrowly obcordate; sets of stamens indistinct.

ORDER 14. LINACEÆ.

A small order represented and characterized by the one genus

1. LINUM, L. FLAX.

Parts of the flower 5, except sometimes in the pistil. Filaments united at the base with commonly alternating teeth. Styles 5, or sometimes only 2 or 3, distinct or united. Stigmas capitate or oblong; ovary globose. Seeds twice as many as the styles. Herbs with sessile entire leaves without stipules, and cymose or panicled flowers.

§ 1. *Styles 5. Flowers blue.*

1. **L. perenne, L.** Smooth, 1 to 2½ ft. high, branching above, leafy; leaves linear to linear-lanceolate, 3 to 18 lines long, acute; stipular glands none; flowers on slender pedicels, scattered, large.

§ 2. *Styles 3; petals appendaged at base, with a tooth on each side and a third adnate to the inner face of the claw.*

* *Flowers yellow; pedicels short.*

2. **L. Breweri**, Gr. Smooth, slender, 3 to 8 inches high or more, few flowered at the summit; leaves linear-setaceous, 6 to 8 lines long; stipular glands conspicuous; petals 3 or more lines long.

* * *Flowers rose-purple to white.*

3. **L. congestum**, Gr. Nearly smooth, excepting the calyx, about a foot high;

stipular glands very small; flowers in close terminal clusters; petals about 3 lines long; capsule globose.

4. **L. Californicum**, Gr. Smooth, glaucous, 6 to 18 inches high; stipular glands conspicuous; flowers in small cymes or the lower solitary; petals 4 lines long, capsule acute, shorter than the calyx.

5. **S. spergulinum**, Gr. Smooth, 6 to 15 inches high; leaves without stipular glands; pedicels 3 to 6 lines long, and mostly solitary; sepals slightly glandular, minute; capsule obtuse, exceeding the calyx slightly.

ORDER 15. GERANIACEÆ.

Flowers perfect on axillary peduncles, regular (in our species) and symmetrical, the parts in fives. Stamens mostly in two sets, those alternate with the petals sometimes sterile. Ovary deeply 5-lobed, with a prolonged axis, or 5-celled.

§ 1. *Carpels 5, one-seeded, separating at maturity from the long central axis; the styles forming long twisted tails.*

Fertile stamens 10; tails of the carpels not bearded.................... **Geranium.** 1
Fertile stamens 5; tails of the carpels bearded.......................... **Erodium.** 2
§ 2. *Carpels 5, one-seeded, fleshy, distinct*.......................... **Limnanthes.** 3
§ 3. *Carpels combined into a 5-celled ovary*.............................. **Oxalis.** 4

1. GERANIUM, L. CRANESBILL.

Stamens 10 with anthers, a gland behind the base of each of the shorter 5; filaments bearded at the base. Ovary 5-lobed; style 5-lobed at the top; the roundish-oblong carpels splitting away from the persistent beaked axis. Leaves palmately lobed and mostly opposite, scarious stipules; swollen-jointed stems.

1. **G. Carolinianum**, L. Diffusely branched, pubescent; leaves 1 to 2½ inches in diameter, palmately 5–7-parted, the divisions cleft into linear lobes; petals rose-colored equaling the awned sepals, 2 or 3 lines long; carpels hairy; tails half an inch long.

G. incisum, Nutt., with large purple flowers, grows in the Sierra Nevada, and in Humboldt County.

2. ERODIUM, L'Her.

Characters as in the last; but the filaments dilated, the 5 opposite to the petals sterile and scale-like; carpels attenuate to a sharp bearded base; the tails long bearded on the inner side. Leaves commonly pinnate and bipinnately parted or lobed; peduncles umbellately 2–several-flowered with a 4-bracted involucre at the base of the pedicels; flowers small.

1. **E. cicutarium**, L'Her. (FILARIA OR PIN-CLOVER.) Hairy, much branched,

decumbent; leaves pinnate the leaflets laciniately pinnatifid with narrow acute lobes, the opposite leaves unequal; the long peduncles in the axils of the smaller leaves bearing 4 to 8-flowered umbels; the slender pedicels at length reflexed, the fruit still erect; the bearded carpels with spirally twisted tails.

2. **E. moschatum**, L'Her. (MUSKY FILARIA.) Similar to the last but of a lighter green and the leaflets unequally and doubly serrate, not pinnatifid. Gives out a musky odor when wilted.

3. **E. macrophyllum**, Hook. & Arn. Leaves reniform-cordate, 1 to 3 inches broad; sepals broad, 5 to 6 lines long.

3. LIMNANTHES, R. Br.

Glands 5, alternating with the petals. Stamens 10. Style 5-cleft at the apex. Annual low diffuse herbs, with pungent juice, growing in wet places; leaves pinnate, without stipules; flowers yellowish-white or rose-colored, solitary on axillary peduncles.

1. **L. Douglasii**, R. Br. Glabrous, yellowish green, weak and succulent stems; leaflets incisely lobed; peduncles at length 2 to 4 inches long; sepals lanceolate, 3 to 4 lines long, half the length of the oblong or obovate, emarginate or truncate petals.

Var **alba**, Hartweg. Villous sepals; shorter, white petals.

4. OXALIS, L.

The parts of the flower in fives. Stamens 10; the filaments dilated and united below. Capsule columnar or ovoid, beaked with the short style. Low herbs with sour watery juice; leaves alternate or radical, digitately trifoliolate, leaflets obcordate.

1. **O. Oregana**, Nutt. (REDWOOD SORREL.) Acaulescent, rusty-villous; rootstock creeping; leaflets broadly obcordate, 1 to 1½ inches broad; petioles 2 to 8 inches long; scapes equaling or exceeding the leaves, mostly 1-flowered; petals 6 to 12 lines long, white or rose-colored, often veined with purple.

2. **O. corniculata**, L. (YELLOW SORREL.) Distinguished by its slender branching stems, and smaller yellow flowers.

ORDER 16. RUTACEÆ.

Pellucid or glandular-dotted aromatic leaves, along with definite hypogynous stamens and definite seeds characterize this order, although some of the orange-tribe have many stamens.

1. PTELEA, L. HOP-TREE.

Flowers polygamous. Sepals, petals and stamens 4 or 5; ovary with a short, thick stipe, 2-celled; style short; fruit a broadly winged orbicular samara, 2-seeded. Flowers small, greenish-white, in terminal cymes or compound corymbs.

1. **P. angustifolia**, Benth. A shrub 5 to 25 ft. high, with chestnut colored punctate bark; leaves 3-foliolate.

ORDER 17. CELASTRACEÆ.

Suffiiciently characterized by the genus

1. EUONYMUS, Tourn.

Sepals and petals 4 or 5, widely spreading; Stamens as many very short on an angled disk; ovary immersed in the disk, 3–5-valved, colored, often warty. Fruit a red aril. Shrubs, with 4-angled branches, opposite petioled exstipulate serrate smooth leaves, and flowers in loose cymes on axillary peduncles.

1. **E. occidentalis**, Nutt. 7 to 15 ft. high; leaves ovate to oblong-lanceolate, acuminate, serrulate, 2 to 4 inches long; peduncles 1–4-flowered; flowers dark reddish-brown, 4 to 6 lines in diameter, the parts in fives.

ORDER 18. RHAMNACEÆ.

Shrubs or small trees, with simple undivided leaves, small and often caducous stipules, and small regular flowers, the stamens borne on the calyx and alternate with its lobes; ovary 2 to 4-celled. Flowers often apetalous; a conspicuous disk adnate to the short tube of the calyx; petals often clawed; style or stigma 2–4-lobed; fruit berry-like or dry, containing 2 to 4 seed-like nutlets.

Calyx and disk free from the ovary; filaments short; fruit berry-like.....**Rhamnus.** 1
Calyx and disk adherent to the ovary; filaments long; fruit dry.........**Ceanothus.** 2

1. RHAMNUS, L.

Small greenish flowers; calyx 4–5-cleft, with erect or spreading lobes, the campanulate tube persistent; petals 4 or 5 or none, on the margin of the disk; claws short; stamens 4 or 5; leaves evergreen.

§ 1. *Flowers diœcious, apetalous, solitary or fascicled in the axils.*

1. **R. crocea**, Nutt. Much branched, 3 to 15 ft. high; leaves coriaceous, oblong or obovate to obicular, 3 to 18 lines long, acutely denticulate, usually yellowish brown or copper-colored beneath; fruit red.

§ 2. *Flowers mostly perfect in pedunculate cymes.*

2. **R. Californica**, Esch. Spreading 4 to 18 ft. high; leaves ovate-oblong to ellip-

tical, 1 to 4 inches long, denticulate or nearly entire; petals very small, broadly ovate, emarginate; fruit blackish-purple.

2. CEANOTHUS, L.

Calyx 5-cleft; the lobes acute; disk thick adhering to the tube and to the ovary; petals on long claws, hooded; stamens 5; filaments long-exserted; ovary 3-lobed; style short, 3-cleft. The small flowers are in showy thyrsoid or cymose clusters. Species difficult.

§ *1. Leaves 3-nerved.*

1. C. **thyrsiflorus**, Esch. (CALIFORNIA LILAC.) Smooth, 6 to 15 ft. high; branches strongly angled; leaves rather thick, oblong to oblong-ovate, 1 to 1½ inches long, usually smooth and shining above, canescent beneath; flowers bright blue in dense compound racemes, terminating the long and somewhat leafy peduncles.

2. C. **integerrimus**, Hook & Arn. Slender, 2 or 3 ft. high; branches round, usually warty; leaves thin, bright green, ovate to ovate-oblong, 1 to 3 inches long; thyrse large, white-flowered.

3. C. **dentatus**, Torr & Gr. Low, not rigid; leaves small glandular-serrate, fascicled, the margin strongly undulate or revolute, somewhat resinous; flowers blue, in small roundish clusters.

4. C. **sorediatus**, Hook & Arn. Rigid; inflorescence pubescent; leaves silky on the nerves, ½ to 1½ inches long; flowers blue in shortly peduncled simple racemes ½ to 2 inches long.

5. C. **divaricatus**, Nutt. Grayish, usually spinose; leaves small, not tomentose beneath; flowers light blue or white, in nearly simple often elongated racemes, 1 to 4 inches long; fruit resinous.

6. C. **incanus**, Torr & Gr. Spinose; leaves hoary beneath with a very minute tomentum, cuneate to cordate at base; flowers in short racemes, white; fruit resinously warty. A straggling shrub along creeks.

§ *2. Leaves pinnately veined.*

7. C. **papillosus**, Torr. & Gr. More or less hispidly villous or tomentose, 4 to 6 ft. high; leaves glandular-serrulate, and the upper surface glandular-papillose, narrowly oblong, 1 to 2 inches long on slender petioles; flowers blue, in close clusters or short racemes, terminating slender naked peduncles; fruit not resinous.

§ 3. *Leaves small, often opposite, very thick, with numerous straight lateral veins; stipules mostly large and warty; flowers in sessile or shortly peduncled axillary clusters; fruit larger, with 3 horn-like or warty prominences below the summit.*

8. C. **crassifolius**, Torr. Erect 4 to 12 ft. high, the young branches white with a villous tomentum; leaves somewhat spinosely-toothed or rarely entire and revolutely margined; flowers light blue or white, in dense clusters.

9. **C. cuneatus**, Nutt. Similar to the last, but less tomentose; leaves cuneate-obovate or oblong, retuse above, on slender petioles; flowers in looser clusters.

10. **C. rigidus**, Nutt. Erect, 5 ft. high, the branchlets tomentose; leaves 2 to 5 lines long, cuneate-oblong or broadly obovate, few toothed above, very shortly petioled; flowers bright blue.

ORDER **VITACEÆ** has but one representative; the well-known California wild grape, **Vitis Californica**, Benth., which is common on the woody banks of streams.

ORDER 19. SAPINDACEÆ.

Trees or shrubs, mostly with compound or lobed leaves, with unsymmetrical or irregular flowers; the order best characterized under its suborders.

Under the order proper belongs

1. ÆSCULUS, L. BUCKEYE.

Leaves opposite, palmately 4–7-foliolate. Calyx tubular, unequally 5-toothed. Petals 4 or 5, unequal, with claws. Stamens 5 to 7, exserted and often unequal. Ovary 3-celled; style long. Fruit a large leathery 3-valved pod.

1. **Æ. Californica**, Nutt. Leaflets, usually 5, smooth, oblong-lanceolate, acute, obtuse at base, slenderly petiolulate, serrulate, 3 to 5 inches long; flowers in a close finely pubescent thyrse which is 6 to 12 inches long; calyx 2-lobed, the lobes scarcely toothed; petals white or pale rose, half an inch long or more; stamens 5 to 7; anthers orange colored. Fruit pear-shaped, 1½ to 2 inches long, containing, usually, one seed.

SUB-ORDER. ACERINEÆ.

Flowers polygamous or dioecious, regular, often apetalous. Ovary 2-lobed and 2-celled, each 1-seeded cell producing a wing. Leaves opposite without stipules.

2. ACER, Tourn. MAPLE.

Leaves palmately lobed. Calyx colored. Petals, usually 5. Stamens 3 to 12 inserted with the petals on a lobed disk. Styles 2. Fruit divaricately 2-winged.

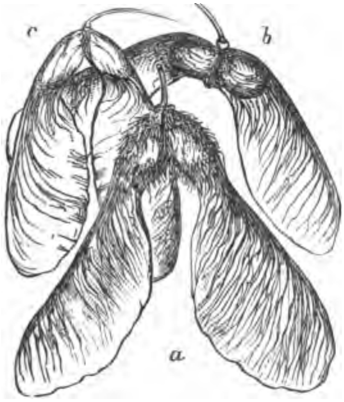
1. **A. macrophyllum**, Pursh. (LARGE-LEAFED MAPLE.) A tree 2 or 3 feet in diameter; leaves 6 to 10 inches in diameter, deeply 3–5-cleft; flowers fragrant, yellow, in crowded pendulous racemes; fruit densely hairy; the smooth wings 1½ inches long.

2. **A. circinatum**, Pursh. (VINE-MAPLE.) A shrub or small tree; leaves 3 to 5 inches broad, 7–9-lobed, lobes sharply serrate; flowers in corymbs loosely 10–20-flowered, on slender 2-leaved branchlets; sepals red or purple, exceeding the greenish petals; fruit smooth.

3. NEGUNDO, Mœnch. BOX-ELDER.

Flowers diœcious. Calyx minute. Petals and disk none. Stamens 4 or 5. **Ovary** and fruit as in *Acer*. Trees; leaves pinnate; sterile flowers on clustered capillary pedicels, the fertile in drooping racemes.

1. **N. Californicum**, Torr. & Gr. Usually a small tree; leaves 3-foliolate, villous; leaflets ovate or oblong, acute, 3 or 4 inches long, the terminal largest and 3–5-lobed or coarsely serrate, the lateral ones coarsely serrate; fruit pubescent; wings slightly spreading.



In the figure *a* represents the fruit of *Acer macrophyllum*, *b* the wider spreading samara of *Acer circinatum*, and *c* the closer wings of *Negundo Californicum*. The first has hairy carpels; the second is smooth, and the last slightly hairy.

ORDER **ANACARDIACEÆ** is represented by the well-known Poison Oak or *Rhus diversiloba*, a slender, sometimes climbing, shrub, resembling the eastern *Rhus toxicodendron*, which is also often called Poison Oak, but is more commonly known as Poison Ivy. The eastern Sumac belongs to the same genus. There are three other species of *Rhus* in the State. The Pepper tree (*Schinus molle*), so commonly cultivated as an ornamental shade tree, belongs to this order.

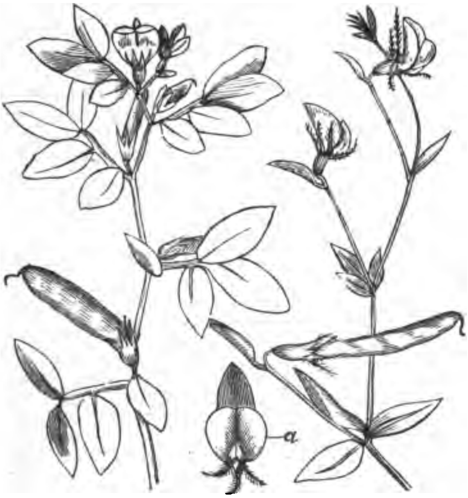
ORDER 20. LEGUMINOSÆ.

The single and simple free pistil becoming a legume in fruit, the alternate leaves with stipules, and in our genera, the papillionaceous corolla with 10 stamens, mark this order, one of the largest and most important in the vegetable kingdom.

Flowers irregular. Calyx 3–5-cleft or toothed, persistent. Corolla of 5 petals, the upper larger and always external, covering the lateral pair in the bud, and these covering the lower pair, which are more or less united, forming a keel which encloses the stamens and pistil. Filaments 10, rarely 5, commonly united around the pistil, either all united or nine and the upper one free. Ovary forming a pod with a single row of seeds attached to one side; style usually inflexed or curved. In *Cercis* the upper petal is small and enclosed by the wings. In *Amorpha* there is but one petal.

Suborder **Cæsalpineæ** is marked by the upper petal enclosed, and distinct stamens.

Suborder **Mimoseæ** has regular flowers and usually many conspicuous stamens.



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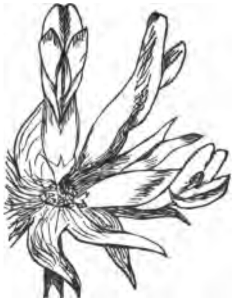
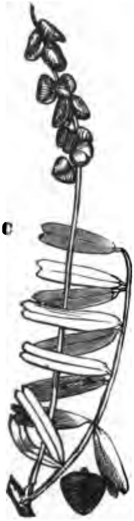


B

Fig. A. On the left is *Hosackia subpinnata*, showing a full grown pod and a flower as seen from above. On the right is a pod and flowers of *Hosackia Purshiana*. At *a* is a single flower with its bract as seen from the front. The lower leaves and bracts are larger.

Fig. B. A head of *Trifolium fucatum*, with all but three of the flowers removed, showing the common receptacle and the involucre.

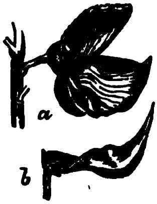
Fig. C. An axillary spike of *Astragalus didymocarpus*, with ripe fruit. Below is one of the pods magnified.



C

This order is remarkable for the number of useful and beautiful plants which belong to it. Pease, beans, lentils, peanuts, clover, alfalfa, etc., furnish food for man and domestic animals. Tropical plants of this order supply, among others, the following articles of commerce: Gum arabic, gum senegal, gum copal, dragon's-blood, indigo, logwood, brazilwood, rosewood, tamarind. Many species have medical value, as senna, catchu, copaiba, etc.

There are over 6,000 species of leguminous plants, mostly tropical. About 350 species are natives of the United States, more than half of which are found in California. Only 4 or 5 species are common to this coast and the Atlantic States, and these have forms peculiar to each coast. Our 180 species are grouped under 14 genera, while the 150 species of the East (*i. e.*, the Mississippi States and eastward to the Atlantic), represent 50 genera. There are about 40 species of lupine, and the same number belonging to the genus Astragalus, growing within the limits of this State. Only two kinds of the former and 4 of the latter grow east of the Mississippi. The latter is the largest American genus of the



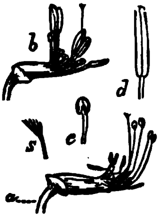


Fig. A. At *a* is seen a single flower of *Lupinus Douglasii*; *b*, the same with the upper and side petals removed, showing the united pair of long-clawed, lower petals and the base of the stamineal tube.

Fig. B. *a*. The same flower with all the petals removed, showing the united stamens, 5 of which have shed the pollen and crinkled down. *b*. The stamens as they appear in a bud. The shorter stamens of the bud become the longer stamens of the flower. *c*. Anther of a long stamen in *a* magnified. *d*. Anther of a long stamen in *b* (short in *a*) magnified.

order, the species within the United States numbering about 150, nearly all of which belong west of the Rocky Mountains. We have about 25 kinds of clover; only 3 or 4 species are natives of the East. Hosackia, numbering 28 species in our whole country, 25 of which grow here, is not represented in the East at all. On the other hand, the large genus Desmodium, numbering in the East 19 species, has no representative west of the Rocky Mountains. Pickeringia is probably not found beyond the boundary of California. The great Australian genus Acacia, numbering there nearly 300 species, is represented in Southern California by a small tree (*A. Greggii*), and in the East by an herb. Possibly 30 species are cultivated for shade trees. Honey Mesquit, or Algaroba (*Prosopis juliflora*) and Screw-pod Mesquit, or Tornilla (*P. pubescens*), are small trees of Southern California. Prosopis and Acacia belong to the Suborder Mimoseæ. All the plants here described (except *Cercis*) belong to the Suborder Papilionaceæ, which is distinguished by flowers, like those of the pea, as before described.

Cercis, which, by mistake, is not described in the proper place, belongs to the Suborder Cæsalpineæ, in which the side petals enclose the upper one and the stamens are free.

§ 1. *Stamens distinct.*

Leaves digitately 3-foliolate. Herbs; yellow flowers	**Thermopsis.**	1
Shrub; purple flowers	**Pickeringia.**	2
Leaves unequally pinnate; shrubby; 1 petal	**Amorpha.**	9

§ 2. *Stamens all united into a sheath.*

Anthers of two forms; leaves digitate, more than three leaflets	**Lupinus.**	3
Anthers all alike; leaves pinnately 3-foliolate	**Psoralea.**	8

§ 3. *Stamens diadelphous (2 sets, 9 and 1).*

* *Leaves 3-foliolate; pods small.*

Flowers capitate. Corolla persistent	**Trifolium.**	4
Flowers in axillary racemes or spikes. Pod globular, wrinkled	**Melilotus.**	5
Flowers in axillary spikes. Pod one-seeded	**Psoralea.**	8
Pod spirally coiled or reniform	**Medicago.**	6

* * *Leaves unequally pinnate; leaflets entire; no tendril.*

Flowers umbellate or solitary, axillary..**Hosackia.** 7
Flowers white or pinkish. Pod short, prickly........................**Glycyrrhiza.** 10
Pods mostly inflated or nearly 2-celled..**Astragalus.** 11

* * * *Leaves terminated by a tendril or bristle or an imperfect leaflet.*

Style filiform, hairy around the apex..**Vicia.** 12
Style flattened dorsally toward the apex, hairy on the inner side, usually twisted half round..**Lathyrus.** 13

1. THERMOPSIS, R. Br.

Calyx companulate, cleft to the middle. Standard roundish, shorter than the oblong wings, the sides reflexed; keel nearly straight, its petals somewhat united, equalling the wings. Perennial herbs with the aspect of Lupine; leaflets entire; stipules foliaceous; flowers large in long terminal racemes, with persistent bracts.

1. **T. Californica**, Wat. Woolly-tomentose; stipules lanceolate; leaflets obovate to oblanceolate, an inch or two long; bracts ovate; pod hairy.

2. PICKERINGIA, Nutt.

Calyx campanulate, turbinate at the base, repandly 4-toothed. Petals equal; standard orbicular, the sides reflexed; wings oblong; keel petals oblong, distinct, straight, obtuse. A low stout much branched spinose shrub; leaves evergreen, small, nearly sessile, 1–3-foliolate, without stipules; flowers large, solitary, axillary, nearly sessile.

1. **P. montana**, Nutt. Spreading, densely branched, 4 to 7 ft. high, silky-tomentose or smooth; leaflets 3 to 9 lines long; flowers from light cinnamon-red to purple, 7 to 9 lines long; stamens persistent.

3. LUPINUS, L. LUPINE.

Calyx deeply bilabiate, bibracteolate. Standard broad, the sides reflexed; wings united at the ends, enclosing the incurved beaked keel. Stipules adnate to the petioles; leaflets entire. Flowers in terminal racemes, verticillate or scattered, bractcate.

A large and difficult genus.

* *Annuals.*

Ovules 2; bracts persistent; flowers in whorls; leaves long petioled, approximate; stout.
Long-villous; flowers mostly purple..............................**L. microcarpus.** 15
Smoother; flowers yellow to white....................................**L. densiflorus.** 16

Ovules several; bracts deciduous; flowers in whorls; petioles 1 to 3 times the length of the leaflets.
Puberulent; leaflets broad, smoother above; bracts short..................**L. affinis.** 8

Villous; leaflets narrow, both sides pubescent.

Bracts elongated; flowers rather large............................**L. nanus.** 9

Bracts short; flowers small, narrow..........................**L. micranthus.** 10

Ovules several; bracts somewhat persistent; flowers scattered; petioles 1 to 4 times the length of the leaflets.

Slender; leaflets smooth above; bracts long.....................**L. leptophyllus.** 11

Slender; leaflets linear; bracts short.............................**L. sparsiflorus.** 12

Stout; leaflets truncate; bracts short...........................**L. truncatus.** 13

Stouter; leaflets broad; bracts short; very hispid..............**L. hirsutissimus.** 14

* * *Perennials; herbaceous, tall; flowers large; ovules 8 to 12.*

Stout; long petioles; leaflets 10 to 16, very large....................**L. polyphyllus.** 4

Stout; short petioles; leaflets 7 to 10, large..........................**L. rivularis.** 5

Slender, decumbent; short petioles; leaflets small.....................**L. littoralis.** 6

Stoutish, erect; short petioles; keel narrow, falcate.................**L. albicaulis.** 7

* * * *Perennials; shrubby, leafy, silky-pubescent.*

Leaflets narrowly lanceolate; flowers yellow..........................**L. arboreus.** 1

Densely silky-pubescent; flowers blue to white...................**L. Chamissonis.** 2

Pubescence short, tomentose; shrubby at the base.................**L. Douglasii.** 3

1. **L. arboreus**, Sims. Often 4 to 8 ft. high; sulphur-yellow, fragrant flowers, verticillate in a loose raceme; pods large, pubescent, 10–12-seeded.

2. **L. Chamissonis.** Esch. Less shrubby, 1 to 4 ft. high; leaflets 7 to 9, cuneate obovate, a half to an inch long, very silky on both sides; bracts lanceolate, shorter than the calyx; flowers sub-verticillate, blue, violet, rarely white. A variety about San Francisco with long bracts.

3. **L. Douglasii**, Agardh. Slightly woody at base; pubescence short, tomentose or silky; leaflets 7 to 9, oblanceolate to cuneate-oblong, 1 to 1½ inches long, pubescent on both sides; bracts linear-setaceous, exceeding the calyx; flowers, blue or purple; calyx with long setaceous bractlets.

4. **L. polyphyllus**, Lindl. Stout, erect, 2 to 5 ft. high, sparingly villous; stipules large, triangular to subulate; leaves distant, long petioled; leaflets 2 to 6 inches long; racemes a foot or two long; flowers mostly scattered on long pedicels, blue, purple or white; bracts oblanceolate, equaling or shorter than the calyx; keel naked.

5. **L. rivularis**, Dougl. Stout, erect, 2 to 6 ft. high, nearly smooth; stipules subulate or setaceous; leaflets 7 to 10, about equaling the petioles, ½ to 5 inches long; raceme often 1 to 2 ft. long; bracts setaceous, exceeding the calyx; flowers purple or rarely white; keel slightly ciliate.

6. **L. littoralis**, Dougl. Stems slender decumbent or ascending, 1 or 2 ft. long; leaflets a half to an inch long, at least half as long as the petioles; flowers blue or violet, with some yellow, in short racemes; keel ciliate; calyx large, with small bractlets.

7. **albicaulis**, Dougl. Distinguished by its flowers; which are light-blue to white, the standard strongly reflexed, the margins cohering near the apex, naked, acute; the narrow keel very strongly falcate.

8. **L. affinis**, Agardh. Stem a foot high; leaflets broadly wedge-obovate, emarginate or obtuse, an inch long or more; the petioles twice longer; petals 5 lines long; the keel usually naked; bracts short.

9. **L. nanus**, Dougl. Slender stem 6 inches to a foot high, villous, often branching from the base; leaflets linear to oblanceolate, half to an inch long, the petioles 1 to 3 times longer; bracts exceeding the calyx; petals very broad, 5 to 6 lines long, bluish-purple, or at first nearly white; the standard shorter and usually marked with purple lines.

10. **L. micranthus**, Dougl. Similar to the last, but the flowers smaller, in usually shorter more dense racemes; bracts shorter than the calyx; petals 2 to 3 lines long, narrow.

Var. **microphyllus**, Wat. The lower and more hirsute form, with leaflets but 3 to 6 lines long.

Var. **bicolor**, Wat. Flowers larger, more like *L. Nanus*.

Var. **trifidus**, Wat. Very hairy; lower lip of the calyx 3-parted.

11. **L. leptophyllus**, Benth. Rarely branched, 1 or 2 ft. high, villous; leaflets narrowly linear on slender petioles; smooth above; bracts setaceous, much exceeding the calyx; petals 5 or 6 lines long, bluish-lilac, with a deep crimson spot upon the standard.

12. **L. sparsiflorus**, Benth. Very slender, sparingly branched, 1 to 1½ ft. high, villous, with spreading hairs; upper leaves very small; leaflets 5 to 9, linear, ½ to 1 inch long; petals violet, 5 lines long, the standard shorter; pod half an inch long.

13. **L. truncatus**, Nutt. Stout, branched, 1 to 2 ft. high; leaflets linear, narrowed from the truncate or somewhat 3-toothed apex to the base, smooth above, ¾ to 1½ inches long, nearly equaling the petiole; petals deep-purple, 4 or 5 lines long, the standard shorter; pod about an inch long.

Here belongs L. STIVERI, Kellogg. A beautiful species of the Sierra Nevada, with yellow standard and rose-colored wings.

14. **L. hirsutissimus**, Benth. A foot high or more, very hispid, with spreading straight and viscid stinging hairs; leaflets broadly cuneate-obovate, obtuse or retuse, rarely acute, mucronulate; flowers in loose racemes, reddish-purple, large.

15. **L. microcarpus**, Sims. Villous, with long hairs, 6 to 18 inches high; leaves approximate on long petioles; leaflets usually 9, cuneate-oblong, obtuse or emarginate, smooth above, 1 to 2 inches long; calyx densely villous, large; petals purple to white, 6 or 7 lines long; the hairy 1–2-seeded pods 8 lines long.

16. **L. densiflorus**, Benth. Much resembling the last; calyx smooth or finely pubescent; petals yellow or ochroleucous, rarely white or pink.

L. luteolus, Kellogg, may be found, distinguished by its more slender habit, smaller and fewer leaflets, and bracts exceeding the calyx.

4. TRIFOLIUM, L. CLOVER.

Calyx 5 cleft with nearly equal teeth, persistent. Corolla withering, persistent; wings narrow, keel short obtuse. Stamens usually diadelphous. Style filiform. Pod small and usually inclosed in the calyx, membranaceous, indehiscent or dehiscent at the ventral suture, 1 to 6-seeded. Herbs with leaves palmately 3 or rarely 5–7-foliolate; stipules adnate to the petiole; flowers in capitate racemes, spikes or umbels, rarely few or solitary; peduncles axillary or only apparently terminal.

All our species annual.

§ 1. *Heads not involucrate; ovules 2.*

* *Heads apparently terminal; flowers sessile, not reflexed; calyx teeth plumose, filiform.*

1. **T. Macræi**, Hook. & Arn. Somewhat villous, erect, 6 to 12 inches high; stipules ovate to lanceolate; leaflets obovate to narrowly oblong, obtuse or retuse, serrulate. about half an inch long; flowers dark purple, 3 lines long, in dense ovate long peduncled heads; calyx very villous; the straight teeth as long as the petals, often tinged with purple; pod 1-seeded.

Var. **dichotomum**, Brew. A taller and stouter form, with larger flowers in heads nearly an inch long; corolla more conspicuous, tipped with white.

* * *Heads axillary, small; flowers on short pedicels, at length reflexed; calyx teeth subulate; mostly smooth.*

2. **T. ciliatum**, Nutt. Erect, often 1 to 2 ft. high; leaflets similar to the last; corolla white or purplish, little exserted, 3 lines long; calyx tube campanulate; the lanceolate teeth very acute, rigid, the scarious margin rigidly ciliate.

3. **T. gracilentum**, Torr. & Gr. Erect, slender, a foot high or less; stipules lanceolate; leaflets cuneate oblong to ovate or obcordate, retuse, about half an inch long, serrulate; flowers pale rose-color or purplish on pedicels a line long or less; calyx campanulate, the subulate teeth nearly equaling the corolla.

4. **bifidum**, Gr. Exactly like the last, but the leaflets narrow, the sides sparingly toothed or entire, and all deeply notched or cleft at the apex.

§ 2. *Heads subtended by an involucre; peduncles axillary; flowers sessile, not reflexed.*

* *Involucre not membranaceous, deeply lobed, and the lobes laciniately and sharply toothed; corolla not becoming inflated.*

5. **T. involucratum**, Willd. Smooth; stems ascending, often a span high or more; leaflets mostly oblanceolate and acute at each end, a half to an inch long; flowers half an inch long, in close heads, purple or rose-colored; the narrow calyx teeth all entire; ovules mostly 5 or 6.

Var. **heterodon**, Wat. Heads larger and leaflets broader; some of the calyx teeth setaciously cleft.

6. **tridentatum**, Lindl. Smooth or glandular-puberulent, slender and usually erect,

a half to two feet high; leaflets linear to narrowly lanceolate, sharply serrate; heads rather large, the flowers 6 to 8 lines long, purple, often tipped with white; calyx strongly nerved; the rigid teeth usually shorter than the tube, abruptly narrowed into the spinulose apex, often with a stout tooth on each side; ovules usually 2.

Var. **obtusiflorum**, Wat. Stouter and often glandular-puberulent, with broader leaflets and larger flowers; calyx teeth entire.

7. **T. pauciflorum**, Nutt. Smooth, very slender; stems ascending or decumbent; leaflets obovate to oblanceolate or sometimes linear, half an inch long or less, serrulate; heads few flowered; involucre small; flowers 3 or 4 lines long, not much exceeding the calyx; deep purple to light rose-colored; calyx teeth subulate, entire; pod 2-seeded.

* * *Involucre membranaceous, at least at the base, less deeply lobed; corolla not inflated.*

8. **T. microcephalum**, Pursh. Villous, with soft hairs, slender, erect or decumbent; stems often a foot or two long; leaflets oblanceolate to obovate, usually retuse, serrulate; heads small, dense; involucre about 9-lobed, the lobes acuminate 3-nerved, entire; calyx hairy, nearly equaling the white or light rose-colored corolla; ovules 2; pod 1-seeded.

9. **T. microdon**, Hook & Arn. Resembling the last; involucre broader, nearly inclosing the head; its lobes about 3-toothed; calyx smooth.

* * * *Standard becoming conspicuously inflated and inclosing the rest of the flower; involucre nearly obsolete in No. 12.*

10. **T. barbigerum**, Torr. Somewhat pubescent; stems rather stout, decumbent or ascending, a span high or less; stipules scarious; involucre as broad as the heads, shortly lobed; calyx-tube short, membranaceous; its teeth setaciously awned, plumose, the lower usually exceeding the purple corolla, sometimes 3-parted; pod 2-seeded.

Var. **Andrewsii**, Gr. A stout villous form, the heads sometimes an inch broad; calyx-teeth very long.

11. **T. fucatum**, Lindl. Smooth; stems stout and succulent, a foot or two high; stipules large and scarious, usually very broad and entire; leaflets obovate, ½ to 1½ inches long; heads large; involucre broad, deeply cleft; flowers often an inch long, pale rose-colored or purplish; 2–6-seeded.

12. **T. depauperatum**, Desv. Smooth, low, slender; heads only 3–10-flowered; involucre scarcely more than a scarious ring.

13. **T. amplectans**, Torr & Gr. Like the last; the involucre larger. Probably only a variety.

5. MELILOTUS, Tourn. SWEET CLOVER.

Flowers as in **Trifolium**, except that the petals are free from the stamens and deciduous. Pod 2-seeded.

1. **M. parviflora.** Desf. Annual, smooth, erect, often 2 or 3 ft. high; leaflets

mostly cuneate, oblong, obtuse, denticulate, an inch long or less; flowers yellow, a line long, in slender axillary pedunculate racemes; pedicels a line long.

6. MEDICAGO, L.

Characters nearly as the last; style subulate; pod compressed, falcate, incurved or spirally coiled.

1. **M. sativa**, L. (LUCERN, ALFALFA.) Stems erect, 1 to 4 ft. high; from a deep perennial root, smooth; leaflets cuneate-oblong or oblanceolate, toothed above; flowers 3 or 4 lines long, racemed; pods numerous, spirally twisted, veined, smooth.

2. **M. denticulata**, Willd. BUR-CLOVER. Annual, nearly smooth, prostrate or ascending; leaflets cuneate-obovate or obcordate, toothed above; flowers small, yellow, usually 3 to 8 in an axillary cluster; pods spiral, armed with a double row of hooked prickles.

3. **M. lupulina**, L. Pubescent, procumbent; flowers very small, yellow, in short spikes; pods smooth, reniform, 1-seeded.

7. HOSACKIA. Douglas.

Calyx teeth nearly equal, usually shorter than the tube. Petals free from the stamens, nearly equal; standard ovate or roundish, the claw often remote from the others; wings obovate or oblong; keel somewhat incurved. Style incurved. Pod linear, sessile, several-seeded, partitioned between the seeds.——Herbaceous or rarely suffrutescent; leaves pinnate, 2–many-foliolate; stipules minute and gland-like, rarely scarious or foliaceous; flowers yellow or reddish, in axillary sessile or pedunculate umbels.

The flowers usually change to reddish or reddish-brown in drying. Matured pods are necessary for the determination of species.

§ 1. *Pod shortly acute, linear and many-seeded, straight, smooth; seeds suborbicular; flowers and fruit not reflexed; peduncles long; keel broad above mostly obtuse.*

Stipules large, foliaceous; villous, viscid.........................**H. stipularis.** 1

Stipules scarious; smooth.

Bract small or none; wings usually white..............................**H. bicolor.** 2

Bract 1–3-foliolate, at the umbel; keel and wings purplish.............**H. gracilis.** 3

Stipules reduced to blackish glands.

Appressed-pubescent; tall, stout; pod long, smooth.................**H. grandiflora.** 4

Flowers very small, solitary...**H. parviflora.** 5

§ 2. *Pod shortly acute, 3–7-seeded, straight; flowers small, mostly solitary; keel acute; stipules gland-like; villous.*

Blade of the standard cordate; leaflets 3 to 5; nearly smooth.........**H. parviflora.** 5

Flowers peduncled; corolla scarcely exceeding the calyx; leaves nearly sessile, 1–3-foliolate.......................................**H. Purshiana.** 6

Flowers nearly sessile, not bracteate; corolla larger; leaves petioled, 3–5-foliolate; low.

Calyx-teeth about equaling the tube, pod 5-seeded................**H. subpinnata.** 7

Teeth much longer than the tube; pod 2–4-seeded..............**H. brachycarpa.** 8

§ 3. *Pod long-attenuate upward, iucurved, pubescent; stipules gland-like; leaflets 3 to 7; seeds 1 or 2; peduncles short or none; flowers and fruit reflexed.*

Somewhat woody; nearly smooth; stems angled; leaflets mostly 3, oblong to linear.

Umbels sessile; teeth narrow, erect.......... ....**glabra.** 9

Peduncles short or nearly wanting; teeth usually recurved........ **H. cytisoides.** 10

Peduncles shorter; teeth short and blunt.............................**H. juncea.** 11

Very silky-pubescent or tomentose; stems herbaceous: pod pubescent, short; umbels on short peduncles.

Very pubescent throughout; flowers 3 or 4 lines long ....**H. tomentosa.** 12

Less pubescent; stem smooth; flowers smaller....................**H. Heermanni.** 13

1. **H. stipularis,** Benth. Rather tall, stout, two feet high or more, glandular; leaflets 15 to 21, obovate oblong, acute and mucronate, a half to an inch long; stipules large ovate; often fragrant.

2. **H. bicolor,** Dougl. Smooth, erect and stout; leaflets 5 to 9, obovate or oblong, a half to an inch long; stipules rather large; peduncles longer than the leaves, 3–7-flowered, naked or sometimes with a small 1–3-foliolate bract at the summit; flowers nearly sessile yellow, the wings often white; pod slender nearly 2 inches long.

3. **H. gracilis**, Benth. Much like the last; usually low and slender, the weak stems a span high or more; umbel with a petioled 1–3-foliolate bract; flowers yellow, keel and wings purplish.

4. **H. grandiflora,** Benth. Stout, 1 to 5 ft. high, more or less appressed silky-pubescent; leaflets 5 to 7 on an elongated rachis, 6 to 9 lines long; peduncles elongated; umbel 3–8-flowered, usually subtended by a single leaflet; flowers nearly sessile, 6 to 11 lines long, yellowish or greenish white, often tinged with purple, pod slender, smooth.

5. **H. parviflora,** Benth. Smooth or nearly so, stems slender, ascending, a span high or less; leaflets 3 to 5, obovate and very small to narrowly oblong and 6 to 8 lines long; bract 1–3-foliolate; flowers about 2 lines long, yellow.

H. Purshiana, Benth. Silky-villous, rarely smooth, often a foot high or more; leaflets varying from ovate to lanceolate, 3 to 9 lines long; peduncles usually exceeding the leaves; the solitary flowers 2 or 3 lines long.

7. **H. subpinnata,** Torr. & Gr. Villous or smooth, decumbent, a span high or less, leaflets half an inch long or less; flowers 3 or 4 lines long; pod linear oblong, about 5-seeded.

8. **H. brachycarpa**, Benth. Resembling the last; softly villous; pod villous, 2-4-seeded.

9. **H. glabra**, Torr. Very nearly smooth; stems woody at base, 2 to 8 ft. long, erect or decumbent; leaflets oblong to linear-oblong, 3 to 6 lines long; umbels numerous, sessile; flowers 3 or 4 lines long; seeds 2.

10. **H. cytisoides**, Benth. Resembling the last; peduncles equaling or exceeding the leaves, or sometimes very short, usually with a 1-3-foliolate bract at the top; calyx-teeth attenuate, mostly recurved.

11. **H. juncea**, Benth. Somewhat shrubby, erect; leaflets obovate to oblong, 2 to 4 lines long; umbels on very short peduncles or sessile; flowers about 3 lines long; calyx 2 lines long or less; teeth short and blunt.

12. **H. tomentosa**, Hook & Arn. Very pubescent, weak and flexuose, prostrate or ascending, a foot or more long; leaflets 5 to 7, cuneate-oblong to obovate, acute, 3 to 6 lines long; umbels on short bracteolate peduncles, or the uppermost sessile; flowers 3 or 4 lines long; calyx half as long or more, very villous.

13. **H. Heermannii**, Durand & Hilgard. Less pubescent, much branched and spreading; leaflets smaller; flowers smaller.

8. PSORALEA, L.

Calyx lobes nearly equal, or the lower one longer; the two upper often connate. Keel broad and obtuse above, united with the wings. Stamens diadelphous or monadelphous. Pod ovate, indehiscent, 1-seeded, thick, sessile. Perennial herbs punctate with dark glandular dots. Leaves pinnately 3-foliolate. Stipules free.

* *Stems prostrate, creeping; leaves orbicular.*

1. **P. orbicularis**, Lindl. Petioles 6 to 12 inches long; the leaflets 2 to 4 inches across, slightly cuneate at the base; peduncles equaling or exceeding the leaves, bearing a close villous spike of large flowers; the lower tooth of the calyx much the longest and about equaling the purplish corolla; stamens diadelphous.

* * *Stems erect.*

2. **P. strobilina**, Hook & Arn. Two or three feet high; petioles 3 or 4 inches long; leaflets rombic ovate, softly pubescent beneath, about 2 inches long; stipules large, membranaceous; flowers in short oblong spikes, smaller than the last; stamens monadelphous.

3. **P. macrostachya**, D C. Three to even twelve feet high; leaflets ovate-lanceolate, an inch or two long or more; peduncles much exceeding the leaves; spikes cylindrical, silky villous, the hairs often blackish; the lower tooth of the calyx but little the longest, scarcely equaling the purple petals; tenth stamen nearly free.

4. **P. physodes**, Dougl. A foot or two high, nearly smooth, slender; leaflets

ovate, mostly acute, about an inch long; the white or purplish flowers in short, close racemes; calyx at length inflated; stamens monadelphous.

9. AMORPHA, L.

Calyx obconical, nearly equally 5-toothed; wings and keel wanting; the standard erect, folded together. Stamens slightly united at the base, exserted. Pod 1–2-seeded. Shrubs, glandular-punctate; the unequally pinnate leaves with the leaflets stipellate; flowers purple or violet in dense clustered terminal spikes.

1. **A. Californica**, Nutt. Three to eight feet high, puberulent; leaflets 5 to 7 pairs, oblong-elliptical, obtuse, mucronulate, an inch long; spikes 1 to 6 inches long.

10. GLYCYRRHIZA, L. LIQUORICE.

Flowers nearly as in *Astragalus*. Erect perennial herbs, glandular viscid; leaves unequally pinnate; stipules deciduous; flowers in dense axillary pedunculate spikes; root large and sweet.

1. **G. lepidota**, Nutt., var. **glutinosa**, Wat. Two or three feet high; flowers yellowish white or pinkish; the short peduncles covered with stout viscid hairs. Rare; on water courses.

10. ASTRAGALUS, Tourn. RATTLE-WEED.

Calyx 5-toothed. Corolla and its slender clawed petals usually narrow; keel obtuse. Stamens diadelphous. Legume very various, commonly turgid or inflated; one or both sutures usually projecting inward, frequently so much as to divide the cell into two. Seeds few or many on slender stalks, generally small for the size of the pod. Herbs, or a few woody at the base; with unequally pinnate leaves, and small flowers, chiefly in simple spikes or racemes from the axils.

A vast genus of five or six hundred species; about fifty on the Pacific coast. The fruit is needed for the determination of the species.

* *Root annual; pod not inflated, 2-celled.*

Pod wrinkled, 2-lobed, 2-seeded.............................**A. didymocarpus.** 1
Pod not wrinkled, several-seeded...**A. tener.** 2.

* * *Root perennial; pod bladdery-inflated, 1-celled.*

Stipe a little exceeding the calyx; pod with pointed ends...........**A. oxyphysus.** 3
Stipe much exceeding the calyx; pod obtuse, one-sided...........**A. leucophyllus.** 4

Stipe, none; pod large and very bladdery, many seeded; leaflets mostly in many pairs; spike or raceme many flowered.

Stipules distinct; pod rather firm walled...........................**A. Crotalariæ.** 5
Stipules united; pod thin...**A. Menziesii.** 6
Stipules membranaceous; corolla yellowish..........................**A. Douglasii.** 7

1. **A. didymocarpus**, Hook. & Arn. Slender from 3 inches to a foot high; leaflets 9 to 15, narrowly oblong to linear and more or less cuneate, deeply notched at the apex; small flowers white and violet; pod not over two lines long, short oval and deeply 2-lobed lengthwise.

2. **A. tener**. Gr. A span or so in hight; leaflets similar to the last, not so deeply notched or entire; pod about half an inch long, 5–10-seeded; corolla 4 or 5 lines long, bright violet to pale and violet-tipped.

3. **A. oxyphysus**, Gr. Canescent with very soft silky pubescence; stem erect, 2 to 3 ft. high; leaflets oblong an inch or less in length; peduncles much exceeding the leaves; corolla greenish-white 8 lines long; bladdery pod acuminate and tapering into the recurved stipe which a little exceeds the calyx.

4. **A. leucophyllus**, Torr. & Gr. Less canescent than the last; flowers about half an inch long; corolla yellowish-white; the thin pod unequal-sided, an inch and a half long on a filiform pubescent stipe of almost equal length.

5. **A. Crotalariæ**, Gr., var. **virgatus**, Gr. Smooth or the young parts villous; stems 2 or 3 ft. high, stout; stipules scarious, triangular or subulate, distinct; peduncles elongated; racemes virgate and loose, 4 to 10 inches long; the white flowers soon deflexed.

6. **A. Menziesii**, Gr. Villous with whitish hairs or soon green and almost smooth; stems sometimes decumbent, 1 to 4 ft. high; the lower stipules united opposite the leaf; inflorescence similar to the last but more dense; pod larger (an inch and a half or more long) and more bladdery.

7. **A. Douglasii**, Gr. Cinereous-puberulent, almost smooth in age, stems ascending, a foot or so in height; leaflets in numerous pairs; linear or linear-oblong, 4 to 9 lines long: spike, half to an inch long; 10–20-flowered; pod gibbous-ovoid, 1½ to 2 inches long.

11. VICIA, Tourn. VETCH. TARE.

Calyx 5-toothed or cleft, usually unequally. Wings adherent to the middle of the short keel. Stamens diadelphous or nearly so. Style filiform, inflexed, the apex surrounded by hairs or hairy upon the back. Pod flat 2-valved, shortly stipitate. Herbs, with angular stems climbing by branched tendrils terminating the pinnate leaves; leaflets entire or toothed at the apex; stipules semi-sagittate; flowers solitary or in loose axillary racemes.

* *Perennials; flowers in pedunculate racemes.*

1. **V. gigantea**, Hook. Stout and tall, climbing several feet high; leaflets 10 to 15 pairs, oblong, obtuse, mucronate, an inch or two long; stipules large; peduncles 5–18-flowered; corolla 6 or 7 lines long, pale purple; pod broadly oblong, 1½ inches long or more, smooth 3–4-seeded.

The seeds are large and edible; blackens in drying.

2. **V. Americana**, Muhl. Usually rather stout, 1 to 4 ft. high, smooth: leaflets 4 to 8 pairs, variable, linear to ovate-oblong, truncate to acute, ½ to 2 inches long; pedun-

cles 4–8-flowered; flowers purplish, 6 to 9 lines long; style very villous at the top; pods an inch long or more, 3–6-seeded.

Var. **truncata**, Brewer. Somewhat pubescent; leaflets truncate and often 3–5-toothed at the apex.

Var. **linearis**, Watson. Leaves all linear. Only the varieties are likely to be found.

* * *Slender annuals; flowers mostly solitary.*

3. **V. exigua**, Nutt. A span to two feet high, somewhat pubescent; leaflets about 4 pairs, linear, acute, a half to an inch long; peduncles usually short, rarely 2-flowered; flowers 3 lines long, purplish; pod about 6-seeded.

4. **V. sativa**, L. Rather stout, somewhat pubescent; leaflets 5 or 6 pairs, obovate-oblong to linear, retuse, long-mucronate; flowers nearly sessile, an inch long, violet-purple.—The common tare of Europe. Introduced.

12. LATHYRUS, L.

Style dorsally flattened toward the top, and usually twisted, hairy on the inner side. Peduncles usually equaling or exceeding the leaves and several flowered.

* *Rachis of the leaves tendril bearing; pod sessile; racemes several flowered.*

1. **L. venosus**, Muhl., var. **Californicus**, Watson. Very stout, several feet high; stems often strongly winged; leaflets oblong-ovate, acute; flowers nearly or quite an inch long, purple; pod about 2 inches long.

2. **L. vestitus**, Nutt. Slender, a foot to 6 or 10 feet high; stems not winged, stipules narrow, often small; flowers pale rose-color or violet, usually 7 to 10 lines long; ovary pubescent.

3. **L. palustris**, L. Slender, a foot or two high; stem often winged; leaflets narrowly oblong to linear, acute, an inch or two long; flowers purplish, half an inch long.

Var. **myrtifolius**, Gr. Stipules broader; leaflets ovate to oblong, shorter.

* *Rachis of the leaves not tendril bearing, or rarely so; pod shortly stiputate, peduncles long; 2–6-flowered.*

4. **L. littoralis**, Endl. Densely silky-villous throughout; stems numerous, from creeping root-stocks, stout, decumbent or ascending, ½ to 2 ft. high; leaflets 1 to 3 pairs, with a small linear or oblong terminal one; calyx teeth nearly equal; standard bright purple, 6 to 8 lines long, exceeding the paler wings and keel; pod villous, an inch long.

ORDER 21. ROSACEÆ.

Herbs, shrubs or trees, with alternate leaves, usually evident stipules, mostly numerous stamens borne on the calyx; distinct free pistils from one to many, or in one suborder few and coherent with each other and adherent to the calyx forming a 2-several celled inferior ovary.

Nearly all the cultivated fruits of the temperate zones belong to this order.

SUB-ORDER 1. AMYGDALEÆ.

Carpels solitary, or rarely 5, becoming drupes, entirely free from the calyx, this or its lobes deciduous.——Trees or shrubs with bark and seeds tasting and smelling like those of the peach or cherry. Stipules few, deciduous.

Flowers perfect; carpel solitary...**Prunus.** 1
Flowers not all perfect; carpels 5...**Nuttallia.** 2

SUB-ORDER 2. ROSACEÆ PROPER.

Carpels free from the persistent calyx becoming akenes, follicles or berries.

§ 1. *Carpels few, becoming follicles; calyx open.*

Shrubs; follicles 2 to 8; flowers minute, in panicles..........................**Spiræa.** 3
Shrubs; follicles 1 to 5; flowers larger, in corymbs...........................**Neillia.** 4

§ 2. *Carpels several or numerous, on a spongy receptacle, forming a compound berry*...**Rubus.** 5

§ 3. *Carpels one or many, becoming dry akenes.*

Shrubs; solitary, axillary apetalous flowers...........................**Cercocarpus.** 6
Herbs; carpels many, on a fleshy receptacle...............................**Fragaria.** 7
Herbs; carpels many, on a dry receptacle—
    Stamens 20 to 25...**Potentilla.** 8
    Stamens 10...**Horkelia.** 9
Shrub: heath-like, with subulate fascicled leaves..................**Adenostoma.** 10

§ 4. *Erect shrubs; showy flowers*..**Rosa.** 11

SUB-ORDER 3. POMEÆ.

Carpels 2 to 5, inclosed in and mostly adnate to the fleshy calyx-tube, in fruit becoming a berry-like pome. Trees or shrubs, with free stipules.

Stamens 10, in pairs; fruit red.......................................**Heteromeles.** 12
Stamens 20; fruit black..**Amelanchier.** 13

1. PRUNUS, Tourn. PLUM, CHERRY, ETC.

Calyx 5-cleft, deciduous. Petals 5, spreading. Stamens 15 to 25, inserted with the petals. Ovary solitary, free, with two pendulous ovules; style terminal. Fruit a drupe, with usually a long stone containing one seed.

Deciduous; flowers white.

Corymbose; appearing before or with the leaves..................	**P. emarginata.**	1
Racemose; appearing after the leaves..............................	**P. demissa.**	2
Evergreen; leafless racemes axillary................................	**P. ilicifolia.**	3

1. **P. emarginata**, Walp. Four to eight feet high, with bark like the ordinary cherry tree, and chestnut-brown very slender branches; leaves oblong-obovate to oblanceolate, obtuse, narrowed to a short petiole; corymb 6–12-flowered, shorter than the leaves; flowers 4 to 6 lines broad; fruit globose, black; stone with a thick grooved ridge upon one side.

2. **P. demissa**. Walp. (WILD CHERRY.) Slender, 2 to 12 ft. high; leaves ovate to oblong-ovate, abruptly acuminate, mostly rounded or somewhat cordate at the base; racemes 3 or 4 inches long; fruit purplish-black or red, edible but astringent.

3. **P. ilicifolia**, Walp. (EVERGREEN CHERRY.) Much branched, 8 to 12 ft. high, with grayish-brown bark; leaves thick and rigid, shining above, broadly ovate to ovate-lanceolate, spinosely toothed; flowers small in racemes ½ to 2 inches long; fruit red or dark purple, half an inch or more thick.

2. NUTTALLIA, Torr. & Gr. OSO BERRY.

Petals 5, broadly spatulate, erect. Stamens 15 in two rows, 10 inserted with the petals, and 5 lower down upon the disk lining the calyx-tube, filaments very short, the lower declined. Carpels 5, inserted on the persistent base of the calyx-tube, free, smooth.

1. **N. cerasiformis**, Torr. & Gr. A shrub 2 to 15 ft. high; leaves rather broadly oblanceolate, short petioled; racemes of greenish white flowers, appearing with the branchlets from the same bud; drupes blue-black; with a slight furrow on the inner side, 6 to 8 lines long, bitter.

3. SPIRÆA, L.

Calyx persistent, 5-lobed. Petals 5, rounded, nearly sessile. Stamens 20 or more, inserted with the petals. Carpels distinct and sessile, becoming several-seeded follicles.

1. S. **discolor**, Pursh. A diffuse shrub, 4 ft. high or more with grayish brown bark, pubescent; leaves broadly ovate, truncate at base or cuneate into a slender petiole, pinnately toothed or lobed, the lobes often dentate; panicle of dingy white flowers much branched, tomentose.

Var. **ariæfolia**, Wat. Taller, 5 to 15 ft. high, leaves 2 or 3 inches long, panicle larger.

Var. **dumosa**. Wat. Only 1 or 2 ft. high, leaves an inch long or less, cuneate into a short margined petiole.

4. NEILLIA, Don. NINE-BARK.

Carpels 1 to 5, inflated and divergent; flowers large, white, in simple corymbs.

1. **N. opulifolia**, Benth. & Hook. A shrub 3 to 10 ft. high, with slender spreading or recurved branches and ash-colored shreddy bark; leaves ovate to cordate, 3-lobed and toothed, 1 to 3 inches long.

5. RUBUS, L.

Calyx persistent 5-lobed. Petals 5, conspicuous. Stamens numerous. Carpels numerous, on a convex receptacle, becoming small globose 1-seeded drupes, forming a compound berry.—Fruit edible.

§ 1. *Fruit with a bloom, separating from the receptacle when ripe.*

Leaves simple, palmately lobed; stem soft, woody.....................**Nutkanus.** 1

Leaves 3-foliolate, or on the flowering branches simple, rarely 5-foliolate; stems soft, woody, prickly—

Flowers large, red..**spectabilis.** 2

Flowers white...**leucodermis.** 3

Stems herbaceous, trailing unarmed......................................**pedatus.** 4

§ 2. *Fruit persistent, black and shining; stems prickly, flowers white*.........**ursinus.** 5

1. R. **Nutkanus**, Moc. (THIMBLE-BERRY.) Stems erect, 3 to 8 ft. high; older bark shreddy, no prickles; leaves 4 to 12 inches broad; flowers large white, rarely rose-colored, an inch or more across; fruit red, large.

2. R. **spectabilis**, Pursh. (SALMON-BERRY.) Stems 5 to 10 ft. high, similar to the last, but armed with a few prickles. Distinguished by its large red flowers and cylindrical-ovoid yellow or purplish berries.

Var. **Menziesii**, Wat. Densely tomentose and silky.

3. R. **leucodermis**, Dougl. (RASPBERRY.) May be known by its leaflets, white-tomentose beneath, prickly stem, white flowers, and its yellowish red white-bloomed fruit.

4. R. **pedatus**, Smith. Stems slender pubescent; leaflets cuneate-obovate, an inch or less in length; flowers white; the at length reflexed sepals exceeding the petals; berry of only 3 to 6 large red pulpy drupelets.

5. R. **ursinus**, Cham. & Schl. (BLACKBERRY.) Stems weak or trailing, 5 to 20 ft. long; fruit oblong.

6. CERCOCARPUS, HBK.

Calyx narrow, tubular, the campanulate 5-lobed limb deciduous. Petals none. Stamens in 2 or 3 rows on the limb of the calyx. Carpels solitary. Fruit a villous akene, included in the enlarged calyx-tube, tailed with the elongated exserted plumose twisted style.

Evergreen shrubs or trees. C. **ledifolius**, Nutt. is the MOUNTAIN MAHOGANY of the Sierra Nevada. The following is found in the Coast Range.

1. **C. parvifolius,** Nutt. A shrub 2 to 10 ft. high, or rarely a tree, branching from a thick base. Tails of the fruit often 4 inches long.

7. FRAGARIA. Tourn. STRAWBERRY.

Calyx persistent; limb 5-toothed, with 5 alternate bractlets. Petals white, spreading. Stamens in one row. Carpels numerous, smooth; styles lateral short. Receptacle much enlarged in fruit, conical, scarlet, bearing the small akenes on its surface.

1. **F. Chilensis,** Ehrh. Densely villous, with silky hairs; leaflets thick, smooth above; flowers often an inch broad; fruit ovate; akenes deeply pitted.

2. **F. Californica,** Cham. & Schl. Somewhat villous; leaves thin, veiny; fruit small; akenes not in pits.

8. POTENTILLA, L.

Calyx as in *Fragaria.* Petals yellow, rarely white. Stamens 20 to 50, marginal in 1 to 3 rows. Carpels numerous. Akenes small, on a dry receptacle.

1. **P. glandulosa,** Lindl. Perennial, erect, a foot or more high; leaves pinnate; leaflets 5 to 9, rounded, ovate, coarsely serrate; flowers cymose; calyx 4 to 6 lines long, usually villous, with coarse hairs; bractlets shorter than the lobes; petals not exceeding the calyx; stamens 25 in one row.

2. **P. Anserina,** L. (SILVER-WEED.) White tomentose and silky-villous leaves, all radical, often a foot long or more; leaflets 3 to 10 pairs, with smaller ones interposed, oblong, sharply serrate, tomentose, at least beneath; flowers yellow, solitary, on scape-like peduncles.

9. HORKELIA, Cham. & Schl.

Petals obovate to linear, often clawed, white or pink. Stamens 10, in two rows; filaments more or less dilated; those opposite to the sepals broadest. Flowers cymose.

* *Bractlets nearly as broad as the calyx-lobes.*

1. **H. Californica,** Cham. & Schl. Glandular-pubescent; stems a foot high or more; leaflets 5 to 10 pairs, 3 to 8 lines long; calyx about equaling the spatulate petals.

Var. **sericea,** Gr. Canescent throughout, with a dense, silky pubescence; leaflets larger.

* * *Bractlets much narrower than the calyx-lobes.*

2. **H. tenuiloba,** Gr. Canescently villous, a foot high; leaflets 8 to 12 pairs, deeply incised, 2 or 3 lines long.

3. **H. Bolanderi,** Gr. Densely hoary-pubescent, cespitose, the stems 3 or 4 inches high, the numerous leaflets minute, with rounded lobes.

10. ADENOSTOMA, Hook & Arn. CHAMISO.

Calyx persistent, 5-lobed; tube obconical, 10-ribbed; lobes membranaceous, broad.

Petals 5, orbicular, spreading. Stamens 10 to 15, usually 2 or 3 together between the petals. Fruit a membranaceous akene, included in the indurated calyx-tube.——Evergreen shrubs, somewhat resinous; flowers small, white, in terminal, racemose panicles.

1. **A. fasciculatum**, Hook & Arn, A diffusely branching shrub, 2 to 20 ft. high, with reddish virgate branches and grayish shreddy bark; leaves fascicled, linear subulate, 2 to 4 lines long, usually channeled on one side, smooth.

Alchemilla arvensis, Scop., belongs here. Its minute, greenish, apetalous flowers are fascicled in the axils of the small leaves and inclosed by the cleft stipules. A small under herb, growing on sandy hillsides.

Acæna trifida, R. & Pav. Is another apetalous herb, with silky, villous leaves and stem rising from a woody caudex; 3 to 15 inches high. The leaves are pinnate, the leaflets pinnately cleft into 3 to 7 segments. The greenish flowers with purple stamens are in a crowded terminal spike. Habitat similar to the last.

11. ROSA. Tourn. Rose.

It is not necessary to here characterize this well-known genus.

1. **R. Californica**, Cham. & Schl. Erect, 2 to 8 ft. high, sparingly armed with usually recurved prickles, tomentose; leaflets 2 or 3 pairs; calyx lobes tomentose, often glandular leafy; petals 6 to 9 lines long; fruit globose.

2. **R. gymnocarpa**, Nutt. Slender, 1 to 4 ft. high, armed with straight slender prickles or unarmed, smooth; leaflets 2 to 4 pairs, glandular; flowers solitary, rarely 2 or 3, rarely an inch in diameter; calyx lobes at length deciduous; fruit small, ovate or pear-shaped.

12. HETEROMELES, J. Rœmer. Photinia.

Calyx 5-parted. Petals 5, spreading. Stamens in pairs, opposite the calyx-teeth. Fruit red, berry-like.——An evergreen shrub or small tree, with coriaceous, simple, sharply serrate leaves. Flowers white in terminal panicles.

1. **H. arbutifolia**, Rœm. Leaves dark green above, lighter beneath, narrowly to oblong lanceolate, acute at each end, 2 to 4 inches long, on short petioles, slightly revolute margins; fruit 2 or 3 lines in diameter.

Pirus rivularis, Dougl., the *Oregon Crab-Apple*, may be found in Sonoma County.

13. AMELANCHIER, Med. Service-Berry.

Calyx-tube campanulate; the limb 5-parted, persistent. Petals 5, oblong, ascending. Stamens 20, short. Carpels 3 to 5 inferior, becoming membranaceous and partially 2-celled; styles united below or distinct. Fruit berry like, globose.—Shrubs or small trees; leaves simple, serrate; flowers white, racemose; fruit purplish, edible.

1. **A. alnifolia**, Nutt. A shrub 3 to 8 ft. high; leaves broadly ovate, sometimes cor late at the base, serrate only toward the summit, ½ to 1½ inches long.

ORDER **CALYCANTHACEÆ**, is represented by *Calycanthus occidentalis*, Hook. & Arn., an erect shrub 6 to 12 ft. high, with opposite entire lanceolate leaves, 3 to 6 inches long and large solitary livid or purplish red flowers; sepals and petals numerous, linear-spatulate. The common name of the Eastern species—*Sweet-Scented Shrub*—is scarcely applicable to our species.

ORDER 22. SAXIFRAGACEÆ.

Herbs, shrubs, or small trees, distinguished from *Rosaceæ* by albuminous seeds; usually by definite stamens, not more than twice the number of the calyx-lobes; commonly by the want of stipules; sometimes by the leaves being opposite; and in most by the partial or complete union of the 2 to 5 carpels into a compound ovary. Seeds usually indefinite or numerous. Petals and stamens on the calyx. Styles inclined to be distinct. Only the *Hydrangieæ* have many stamens.

Tribe 1. SAXIFRAGEÆ. Herbs, leaves mostly alternate and without distinct stipules. Styles or tips of the carpels distinct. Fruit capsular or follicular.

* *Ovary with 2 or rarely more cells, or of as many distinct carpels.*

Stamens 10, rarely more	**Saxifraga.**	1
Stamens 5	**Boykinia.**	2

* * *Ovary 1-celled.*

Stamens 10, included	**Tellima.**	3
Stamens 10, exserted	**Tiarella.**	4
Stamens 5, and styles 2	**Heuchera.**	5

Tribe 2. HYDRANGIEÆ. Shrubs, leaves opposite, simple, no stipules. Fruit capsular.

A tall shrub. Large white flowers	**Philadelphus.**	6
Low, scarcely shrubby. Small flowers	**Whipplea.**	7

Tribe 3. GROSSULARIEÆ. Shrubs, leaves alternate with stipules adnate to the petiole or wanting. Fruit a berry.

Calyx-tube adnate to the ovary	**Ribes.**	8

1. SAXIFRAGA, L. SAXIFRAGE.

Calyx 5-lobed, free, or its tube coherent with the lower part of the ovary. Petals 5. Fruit of 2 follicles, or a 2-lobed capsule.—In our species stemless; flowers white.

1. **S. Virginiensis**, Michx. Leaves thickish, oblong-ovate to spatulate-obovate, coarsely toothed or almost entire, an inch or two long and the margined petiole often as long; scape viscid pubescent, 4 to 12 inches high, at length loosely many flowered in a paniculate cyme; flowers, small white.

2. **S. integrifolia,** Hooker. Larger; leaves shorter petioled; flowers in a thyrsiform panicle; calyx lobes reflexed.

3. **S. Mertensiana,** Bong. Scape and leaves from a scaly granulate bulb; leaves rounded and cordate on long naked petioles; crenately or incisely lobed, the lobes often 3-toothed at the end; 2 to 4 inches across; calyx free.

2. BOYKINIA, Nutt.

Calyx 5-lobed, adherent to the ovary. Petals 5, entire, closed. Stamens alternating with the petals. Ovary and capsule 2-celled.—Perennial herbs, with creeping rootstocks, simple leafy stems; the leaves alternate, round-reniform, palmately lobed and incised or toothed, the teeth with callous-glandular tips, and the petioles mostly with stipule-like appendages at the base.

1. **B. occidentalis,** Torr. & Gr. Smoothish, or with some rusty hairs; a foot or two high; leaves thin-membranaceous, 3–7-lobed; petals white, 2 or 3 lines long.

3. TELLIMA, R. Br.

Calyx campanulate or turbinate, 5-lobed; the base coherent with the lower part of the ovary. Petals 5, inserted in the throat or sinuses of the calyx, laciniate-pinnatifid, 3–7-lobed, or entire. Stamens 10, short. Ovary short, 1-celled, with 2 or 3 parietal placentæ; styles 2 or 3, very short; stigmas capitate. Capsule conical, slightly 2–3-beaked.—Perennials, with round-cordate and toothed or palmately divided chiefly alternate leaves, few on simple stems, their petioles with stipule-like dilations at the base, and the flowers in a simple terminal raceme; petals white or pinkish.

Petals laciniate-pinnatifid	**T. grandiflora.**	1
Petals entire, spatulate-obovate	**T. Cymbalaria.**	2
Petals entire; pedicels very short	**T. Bolanderi.**	3
Petals obtusely 3-lobed	**T. heterophylla.**	4
Petals acutely 3-lobed	**T. affinis.**	5

1. **T. grandiflora,** Dougl. A foot or more high, from short stout tufted rootstocks, hirsute or pubescent; leaves lobed, 2 to 4 inches in diameter; flowers dull-colored.

2. **T. Cymbalaria,** Gr. Stem or scape filiform, 4 to 12 inches high, bearing mostly a pair of opposite 3-lobed or parted leaves; radical leaves somewhat 3–5-lobed, half an inch across, flowers few and slender pediceled, white.

3. **T. Bolanderi,** Gr. Stems a foot or two high, 1–4-leaved; radical and lower leaves lobed, the upper 3–5-parted; petals rarely with a small tooth on each side, white.

4. **T. heterophylla,** Hook. & Arn. Stems slender, a foot or less in height 1–3-leaved; leaves similar to the last, but smaller; flowers fewer and smaller, sometimes flesh-colored.

5. **T. affinis,** Gr. Rougher-pubescent; stem and leaves similar to the last; calyx densely rough glandular-pubescent; petals 4 or 5 lines long, white or flesh-colored.

4. TIARELLA, L.

Distinguished by the minute, slender petals, long exserted stamens, and the very unequal horns of the 2-carpeled ovary.

1. **T. unifoliata**, Hook. Somewhat hairy; flowering stems 4 to 15 inches high, 1–3-leaved; leaves thin, cordate, 3–5-lobed, crenate-toothed; flowers small, panicled.

5. HEUCHERA, L. ALUM-ROOT.

Calyx tube coherent with the lower half of the ovary. Petals small, entire, clawed. Ovary more or less 2-beaked; the beaks tapering into either filiform long, or subulate shorter styles.—Herbs with small, dull-colored paniculate flowers. Scarious stipules adnate or distinct. Leaves round-cordate, obtusely lobed, crenate-toothed.

1. **H. micrantha**, Dougl. Scape, or few leaved flowering stems, a foot or two high; leaves 2 to 4 inches in diameter; calyx acute at the base, lobes erect; styles slender.

2. **H. pilosissima**, Fisch. & Mey. Very villous-pubescent or hirsute, with viscid hairs; calyx rounded or obtuse at the base, the broad, short lobes incurving, densely hairy; styles short.

6. PHILADELPHUS, L. MOCK ORANGE.

Calyx adhering to the ovary nearly or quite to the summit, persistent. Petals 4 or 5, large, obovate or roundish. Stamens 20 to 40. Styles 3 to 5, united at the base or nearly to the top.—Shrubs with opposite leaves and showy white flowers.

1. **P. Gordonianus**, Lindl. Six to twelve feet high; leaves ovate to oblong-ovate, mostly coarsly-serrate, 2 to 4 inches long; flowers in loose clusters, which are leafy at the base; petals frequently an inch long.

7. WHIPPLEA, Torr.

Calyx lobes thin, white or whitish. Petals ovate or oblong. Ovary 3 to 5-celled. Styles distinct, subulate.—Small, trailing or diffuse, ours half shrubby plants, with opposite, short petioled, 3-ribbed leaves, no stipules and small white cymose-clustered flowers; peduncles naked, terminal.

1. **W. modesta**, Torr. Leaves membranaceous, ovate or oval, obtusely few-toothed or entire, an inch or less long. Flower 2 lines long, clusters close-flowered, fragrant.

8. RIBES, L.

Calyx tube adnate to the globose ovary and extended beyond it, the limb commonly petaloid. Petals erect, mostly smaller than the calyx-lobes. Stamens alternate with the petals. Berry crowned by the withered remains of the flower. — Shrubs with alternate palmately lobed leaves.

§ 1. *Thorny under the fascicles.* GOOSEBERRIES.

Berry prickly	**R. Menziesii.**	1
Berry smooth	**R. divaricatum.**	2
Berry dry; flowers large, bright-red	**R. speciosum.**	3

§ 2. *Thornless and prickless.* CURRANTS.

Flowers rose-red to white	**R. sanguineum.**	4
Flowers golden yellow	**R. aureum.**	5

1. **R. Menziesii,** Pursh. Calyx about half an inch long, purplish red; its oblong lobes spreading or recurved, longer than the funnelform tube, hardly longer than the stamens which surpass the whitish petals; berry thickly covered with prickles.

2. **R. divaricatum,** Dougl. Flowers one-third of an inch long; calyx livid-purplish or greenish-white; its lobes about twice as long as the fan-shaped white petals, these only one-third as long as the stamens and villous 2-cleft style.

3. **R. speciosum,** Pursh. Very tall; flowers 2 to 5 on a bristly-glandular peduncle, drooping, fuchsia-like, almost an inch long and stamens as much longer.

4. **R. sanguineum,** Pursh. Racemes drooping, many flowered; calyx prolonged beyond the ovary into a campanulate tube 2 or 3 lines long, about equaling the lobes.—Runs into indefinite varieties.

5. **R. aureum,** Pursh. Flowers golden yellow, spicy-fragrant, in 5–10-flowered, leafy-bracted racemes.

ORDER 23. CRASSULACEÆ.

Succulent or fleshy plants, with completely symmetrical as well as regular flowers.

Parts of the flower each 4 to 7; stamens twice as many. Petals distinct	**Sedum.**	1
Petals somewhat united	**Cotyledon.**	2

1. SEDUM, L. STONE-CROP.

Sepals 4 or 5 united at the base. Carpels distinct or rarely connate at the base.

1. **S. spathulifolium,** Hook. Stems ascending from a branched rooting caudex, 4 to 6 inches high; leaves obovate or spatulate, flat, 6 to 10 lines long; flowers secund in a forked cyme, nearly sessile, 3 lines long; petals yellow, lanceolate acute.

2. COTYLEDON, L.

Petals united into a 5-lobed pitcher-shaped or cylindrical corolla. Stamens 10, inserted on the corolla-tube. Carpels usually distinct.

1. **C. farinosa,** Benth. & Hook. Acaulescent, more or less mealy-pulverulent; rosulate leaves lanceolate, acuminate, the larger ones 2 to 4 inches long; flowering branches a span high with scattered broadly ovate to lanceolate clasping leaves. Flowers yellow.

2. **C. cæspitosa**, Hawworth. Similar to the last; smooth glaucous-green; flowering branches 6 to 12 inches high, with broadly triangular-ovate clasping leaves. The most common species.

TILLÆA MINIMA, Miers., a small herb 1 to 3 inches high with clusters of minute white flowers in the axils of the opposite leaves is a common under-herb in moist places; as is also *T. angustifolia*, Nutt., only an inch high with solitary flowers.

ORDER **LYTHRACEÆ** is represented by *Lythrum alatum*, Pursh., var. *linearifolium*, Gr. An herb a foot or two high with angled stemes and small deep purple 6-petaled flowers solitary in the axils of the entire sessile leaves.

ORDER 24. ONAGRACEÆ.

Herbs (shrubby exotics), with the parts of the flowers in fours, the calyx tube adnate to the ovary, the petals borne on its throat, and the stamens as many or twice as many. Style always single.

Aquatic stems creeping	Jussiæa.	1
Flowers scarlet, fuchsia-like	Zauschneria.	2
Flowers small, purplish, leaves mostly opposite	Epilobium.	3
Anthers attached near the center	Œnothera.	4
Flowers purple, calyx lobes reflexed	Godetia.	5
Petals clawed, calyx-tube short	Clarkia.	6
Petals clawed, calyx-tube filiform	Eucharidium.	7
Flowers purple in leafy spikes	Boisduvalia.	8
Flowers minute, white, parts in twos	Circæa.	9

1. JUSSIÆA, L.

The 4 to 6 herbaceous lobes of the calyx persistent. Petals as many, obovate, spreading, yellow. Stamens twice as many. Capsule clavate.

1. **J. repens**, L., Var. **Californica**, Wat. Characterized sufficiently by its creeping stems and its solitary axillary flowers nearly an inch in diameter.

2. ZAUSCHNERIA, Presl.

Tube of the calyx much prolonged beyond the linear ovary, colored, the 4-lobed limb with 8 small deciduous scales, 4 erect and 4 deflexed. Stamens 8, exserted.

1. **Z. Californica**, Presl. The scarlet fuchsia-like flowers over an inch long cannot be mistaken.

3. EPILOBIUM, L. WILLOW-HERB.

The seeds tufted with silky hairs in linear 4-sided, 4-valved capsules best mark this difficult genus.

4. ŒNOTHERA, L.

Calyx tube more or less prolonged beyond the ovary; segments reflexed. Petals 4; in our species yellow. Stamens 8, equal, or those opposite to the petals shorter. Style filiform; stigma 4-lobed or capitate. (See Addenda.)

* *Acaulescent. Calyx-tube filiform above the under-ground ovary.*

Leaves ovate to lanceolate	Œ. **ovata.**	1
Leaves linear	Œ. **graciliflora.**	2

* * *Caulescent. Calyx-tube obconic; capsule sessile, linear.*

Leaves thick; flowers small; capsule thick	Œ. **cheiranthifolia.**	3
Flowers large; petals with a spot at the base	Œ. **bistorta.**	4
Flowers small; capsule contorted	Œ. **micrantha.**	5

Slender, leafy annuals; leaves linear; flowers small; capsule narrowly linear.

Flowers rarely reddening	Œ. **dentata.**	6
Flowers usually reddening	Œ. **strigulosa.**	7

1. Œ. **ovata**, Nutt. The radical leaves 4 to 6 inches long; calyx-tube scape-like, 1 to 4 inches long.

2. Œ. **graciliflora**, Hook & Arn. Canescently villous; calyx-tube equaling the leaves, 6 to 18 lines long; petals obcordate, 3 to 5 lines long, smaller than the last.

3. Œ. **cheiranthifolia**, Horn. Canescently pubescent; stems decumbent or ascending, 2 ft. long or more; leaves oblong or narrowly oblanceolate, sometimes broadly ovate or cordate, ½ to 2½ inches long, mostly entire, the lower petioled, the upper often clasping; ovary and calyx villous; flowers 2 to 5 lines in diameter; capsule 4 to 8 lines long. Near the sea on drifting sands.

4. Œ. **bistorta**, Nutt. Less common than the last; distinguished by its petals, 4 to 6 lines long, usually with a brown spot.

5. Œ. **micrantha**, Horn. A variable species distinguished from the last by its flowers, only 2 to 4 lines in diameter, with the petals sometimes 3-lobed; and by the contorted slender capsules, 8 to 18 lines long.

6. Œ. **dentata**, Cav. A span high or less; leaves linear, sessile, denticulate, 6 to 18 lines long; petals rounded, 2 to 4 lines long; capsule slender, attenuate, an inch long or more.

7. Œ. **strigulosa**, Torr. & Gr. Like the last; the capsule obtuse, scarcely attenuate. More common than the last.

Œnothera, biennis, L., the *Evening Primrose*, if found, may be known by its tall, erect stem and large flowers.

5. GODETIA, Spach.

Distinguished from **Œnothera** by the anthers not versatile, and flowers not yellow.

* Flowers in a strict, mostly compact spike; capsule ovate to oblong; stems leafy.

Petals deep purple..........G. purpurea. 1
Petals rose-colored with a spot..........G. lepida. 2
Petals bluish-purple, 3 to 5 lines long..........G. albescens. 3

* * Flowers in usually a loose spike or raceme, mostly nodding in the bud; capsule linear; leaves distant.

+ Capsule sessile; stigma-lobes purplish.

Ovary and capsule short, villous, 2-costate..........G. quadrivulnera. 4
Capsule puberulent, not costate..........G. tenella. 5
+ + Capsule pedicellate, not costate, stigma-lobes mostly yellow......G. amœna. 6
Small, hispid..........G. hispidula. 7
Small, petals 2-lobed..........G. biloba. 8

1. **G. purpurea**, Wat. Mostly very leafy, a foot or two high, puberulent, the ovary densely villous; leaves oblong to oblong-oblanceolate, an inch or two long, entire, sessile; flowers mostly in a leafy terminal cluster; petals 4 to 6 lines long; style shorter than the stamens; stigma-lobes very short, purple; capsule 6 to 9 lines long, not costate.
2. **G. lepida**, Lindl. Canescently puberulent, the stem usually white and shining. Easily distinguished by its flowers; the rose-colored petals with a dark spot near the top 9 to 12 lines long.
3. **G. albescens**, Lindl. Smaller leaves than the last, and much smaller almost blue flowers. Rare.
4. **G. quadrivulnera**, Spach. Puberulent, ovary and capsule more or less villous; stems usually slender, a foot or two high; leaves linear-lanceolate or linear, sessile or attenuate to a short petiole, entire or slightly denticulate, an inch or more long; petals deep-purple or purplish, 3 to 6 lines long; stigma-lobes short, purple.
5. **G. tenella**, Wat. Chiefly distinguished from the last by the capsule, which is 8 to 14 lines long, with nearly flat sides.
6. **G. amœna**, Lilja. Petals and purple anthers, frequently rather villous, varying from nearly white to rose-color, with more or less of purple, 8 to 15 lines long; capsule attenuate at each end.
7. **G. hispidula**, Wat. Is about a span high, often but 1-flowered; leaves narrowly linear; purple petals, 6 to 12 lines long.
8. **G. biloba**, Wat. Petals 2-lobed. Foot-hills of the Sierra Nevada.

6. CLARKIA, Pursh.

Petals 4, with claws, entire, purple. Stamens 8. Stigma with 4, at length spreading, sometimes unequal lobes. Capsule linear, 4-angled. Annuals, with erect brittle stems and alternate leaves on short petioles.

1. **C. elegans**, Dougl. Stems from 6 inches to 6 feet high; leaves broadly ovate to linear, repandly toothed; petals rhomboidal; stigma-lobes equal; capsule nearly sessile.

2. **C. rhomboidea**, Dougl. Is smaller; leaves petioled; claws of the petals toothed; capsule short, pediceled.

7. EUCHARIDIUM, Fisch. & Mey.

Distinguished from *Clarkia* by the filiform calyx tube prolonged above the ovary, and stamens only 4.

1. **E. concinnum**, Fisch. & Mey. Closely resembles *Clarkia rhomboidea* in habit and foliage, calyx-tube an inch long; petals 3-lobed. Common.

8. BOISDUVALIA, Spach.

Petals 4, obovate-cuniform, sessile, 2-lobed, purple to white. Anthers not versatile.—Leaves alternate, simple, sessile; the small flowers in leafy spikes; our species villous.

1. **B. densiflora**, Wat. Canescent; 6 inches to 2 ft. high; leaves lanceolate to linear-lanceolate, mostly denticulate, 1 to 3 inches long; the floral leaves usually short and broad; flowers in usually a close terminal leafy spike or numerous short lateral spikelets; petals 3 to 6 lines long.

2. **B. Torreyi**, Wat. Rather slender, a span or two high; leaves 4 to 9 lines long; the floral leaves scarcely smaller; flowers very small.

9. **Circæa, Pacifica**, Asch. & Magn. In moist woods. Distinguished by its small indehiscent pear-shaped fruit covered with bristles and thin ovate opposite leaves.

ORDER 25. LOASACEÆ.

Herbaceous plants with either stinging or jointed and rough-barbed hairs; no stipules, calyx tube adnate to the 1-celled ovary. Stamens usually very numerous.

1. MENTZELIA, L.

Calyx cylindrical to ovoid; the persistent limb 5-toothed. Petals 5 or 10. Stamens numerous, inserted below the petals on the throat of the calyx; filaments free or in clusters opposite the petals, filiform or the outer petaloid. Style 3-cleft, the lobes often twisted.—The leaves are alternate, mostly coarsely-toothed or pinnatifid; flowers white to yellow or orange. (See ADDENDA.)

1. **M. albicaulis**, Dougl. Slender, 6 to 12 inches high or more; leaves linear-lanceolate, pinnatifid with numerous narrow lobes, the upper leaves broader and often lobed

at the base only; flowers near the ends of the branches; petals 5, spatulate or obovate 2 to 3 lines long; capsule 6 to 9 lines long.

2. **M. gracilenta**, Torr. & Gr. Stems similar to the last; petals obovate, abruptly acuminate, an inch long; capsule 12 to 15 lines long.

3. **M. lævicaulis**, Torr. & Gr. Stout 2 or 3 ft. high; leaves lanceolate 2 to 8 inches long; flowers sessile on short branches, very large, light yellow; petals acute, 2 to 2½ inches long.

ORDER **CUCURBITACEÆ** is represented by **Megarrhiza Marah**, Wat. (BIG-ROOT). The cucumber-like vines, often 10 or even 30 ft. long; the sterile flowers white in racemes 4 to 12 inches long; the fruit ovate oblong, more or less covered with weak spines inclosing several nut-like seeds. **M. Californica**, Torr., has stiffer spines on smaller fruit; the fertile flowers without abortive stamens.

ORDER **FICOIDEÆ** is represented by **Mesembryanthemum æquilaterale**, Haw., a very fleshy herb, with opposite three sided leaves 1 to 3 inches long and solitary red flowers; the petals numerous, linear. On the sea shore **Mollugo verticellata**, L., will scarcely be noticed.

ORDER 26. UMBELLIFERÆ.

Herbs with small flowers in umbels, stamens and petals 5, borne on a 2-celled ovary which in fruit splits into a pair of dry usually flat indehiscent carpels. Since the generic distinctions depend upon characters of fruit and seed difficult of determination, the plants of this order are not here described.

ORDER **ARALIACEÆ** is represented by *Aralia Californica*, Wat. (SPIKENARD.) Grows in woods, along streams. Herbaceous stems, 8 to 10 ft. high; the white flowers in panicles a foot or two long and more.

ORDER 27. CORNACEÆ.

Trees or shrubs, rarely herbs, with simple entire mainly opposite leaves, no stipules, and flowers in cymes, capitate clusters or spikes; the petals and stamens 4, epigynous; calyx adnate to the 1–2-celled ovary, which becomes a drupe or berry.

1. CORNUS, L.

Flowers perfect. Calyx minutely 4-toothed. Petals 4, oblong or ovate. Stamens 4, with slender filaments. Style slender; stigma capitate or truncate. Fruit ovoid or oblong.

* *Flowers greenish, in a close head, surrounded by an involucre of 4 to 6 large, white, petal-like bracts.*

1. **C. Nuttallii**, Audubon. Usually a small tree; the involucre of yellowish or

white, often reddish bracts, 1½ to 3 inches long, abruptly acute. Fruit a large cluster of crimson berries.

2. C. **Canadensis**, L. Stem simple, herbaceous, 3 to 8 inches high; leaves in a whorl of 6 at the top, and a pair below; the 4 bracts 4 to 8 lines long.

* * *Flowers white or cream colored, cymose, not involucrate.*

3. C. **Californica**, C. A. Meyer. A shrub, 6 to 15 ft. high, with smooth, purplish branches; leaves ovate acute, obtuse at the base, 2 to 4 inches long, lighter colored beneath, with loose, silky hairs; flowers in small, dense, round-topped cymes.

4. C. **glabrata**, Benth. Bark gray; leaves oblong to narrowly ovate, acute at each end, alike green on both sides; flowers in open, flat cymes.

GARRYA ELLIPTICA, Dougl. and *G. Fremontii*, Torr., diœcious shrubs, belong here. The evergreen coriaceous leaves are opposite on the 4-angled branchlets, the short petioles counate; the apetalous flowers in axillary aments. Leaves of the former elliptical, undulate margins; the staminate aments long; leaves of the latter ovate to oblong, not undulate, lighter green.

DIVISION 2. GAMOPETALÆ.

ORDER 28. CAPRIFOLIACEÆ.

In our species shrubs with opposite leaves, no stipules, the calyx adherent to the 2–5-celled ovary, the stamens as many as the lobes of the rotate or tubular corolla.

Corolla rotate, regularly 5-lobed; white.................................**Sambucus.** 1
Corolla bell-shaped, regularly 4–5-lobed, pinkish.................**Symphoricarpus.** 2
Corolla tubular, irregular...**Lonicera.** 3

1. SAMBUCUS, Tourn. ELDER.

Calyx teeth corolla lobes and stamens 5. Stigmas 3 to 5. Berries really drupes.—Shrubs whose rank shoots are filled with a pith, half an inch in diameter. Leaves pinnately 5–11-foliolate. Flowers small, in large compound cymes.

1. S. **glauca**, Nutt. Cyme flat, 5-parted; fruit black, with a white bloom.
2. S. **racemosa**, L. Cyme ovate or pear-shaped; fruit bright red. Rare.

2. SYMPHORICARPUS, Dill. (SNOWBERRY).

Calyx 5-toothed, occasionally 4-toothed, persistent. Corolla nearly or quite regular, from open campanulate to salver-form, 5–4-lobed. Stamens as many as the lobes of the corolla, inserted on its throat. Fruit globular, white.—Low shrubs, with oval or oblong leaves, mostly entire; and 2-bracteolate flowers in axillary and terminal clusters; rarely solitary.

1. **S. racemosus**, Mich. Erect, smooth; corolla very villous within.

2. **S. mollis**, Nutt. Low, diffuse or decumbent, softly pubescent; leaves small; corolla slightly villous.

2. LONICERA, L. HONEYSUCKLE.

Corolla tubular, the tube commonly gibbous at the base and irregularly lobed. Stamens 5 inserted on the tube of the corolla. Style filiform; stigma capitate.

1. **L. hispidula**, Dougl. Stems disposed to twine; leaves mostly oval, the lower short petioled, the upper pairs commonly connate; foliaceous stipule-like appendages between the leaves common; flowers sessile in a terminal head, pink or yellowish; berries red or orange. Variable.

2. **L. involucrata**, Banks. An erect shrub, 4 to 10 ft. high; leaves ovate-oblong to broadly lanceolate, short-petioled; flowers a pair on axillary peduncles; below them a conspicuous involucre of 4 bracts, tinged with red or yellow; berries purple-black.

ORDER 29. RUBIACEÆ.

Known by having opposite entire leaves with intervening stipules, or whorled leaves without stipules, along with an inferior ovary and regular 4–5-merous flowers; the teeth of the calyx sometimes wanting. Stamens alternate with the lobes of the corolla and borne on its tube, distinct.

1. CEPHALANTHUS, L. BUTTON-BUSH.

Flowers in a dense spherical head. Calyx inversely pyramidal, 4–5-toothed. Corolla with a long, slender tube and a small 4-cleft limb. Stamens 4, borne on the throat of the corolla, short. Style very long and slender.—Shrub with opposite leaves and stipules, or in whorls of 3 or 4. Peduncles axillary; flowers white.

1. **C. occidentalis**, L. Leaves ovate or lanceolate, 3 to 5 inches long; flower heads an inch in diameter.

2. GALIUM, L. CLEAVERS.

Limb of the calyx obsolete. Corolla rotate, 4-parted, rarely 3-parted. Styles 2. Ovary 2-lobed. Fruit twin, biglobular. Herbs, sometimes woody at the base, with square stems, whorled leaves and minute flowers.

Leaves in fours, hispid, ovate	**G. Californicum.**	1
Leaves in fours and pairs, smooth	**G. Nuttallii.**	2
Leaves mostly in whorls of eight	**G. Aparine.**	3

Leaves in fives and sixes; fruit hairy..............................	G. **triflorum.**	4
Leaves 4, 5 or 6 in a whorl; flowers white..............................	G. **trifidum.**	5
Leaves in fours, 3-nerved, lanceolate..............................	G. **boreale.**	9

1. G. **Californicum,** Hook and Arn. Low, branching; sterile flowers terminal, in threes, corolla yellowish; fertile ones solitary, recurved in fruit; fruit purple.

2. G. **Nuttallii,** Gr. Leaves 2 to 5 lines long, thickish, varying from ovate-oblong to linear-lanceolate, margins ciliate; flowers solitary.

3. G. **Aparine,** L. The margins midrib, and angles of the branches armed with spinulose bristles; peduncles 1–2-flowered; fruit large, white. (?)

4. G. **triflorum,** Michx. Bright green, nearly smooth; leaves oblong-lanceolate, acute at both ends, the margins and midrib often beset with hooked bristles; peduncles once or twice 3-forked; with hooked bristles.

5. G. **trifidum,** L. Nearly smooth, except the roughened angles of the slender stems; leaves 3 to 9 lines long; lobes of the white corolla often only three; fruit smooth.

6. G. **boreale,** L. Cymes many flowered, in a thyrsiform panicle.

ORDER 30. VALERIANACEÆ.

Herbs with opposite leaves, no stipules; the distinct stamens fewer than the lobes of the corolla, and borne on its tube; the inferior ovary with two empty cells, and one containing a solitary ovule, ripening into a kind of akene.

1. PLECTRITIS, (Lindl.) DC.

Limb of the calyx obsolete. Tube of the corolla very gibbous, spurred at the base; the short limb bilabiate; upper lip 2-cleft, lower 3-cleft. Fruit winged by the open sterile cells. Flowers white, small.

1. P. **congesta,** DC. Corolla about 3 lines long; its spur much shorter than the tube.

2. P. **macrocera,** Torr. & Gr. Corolla smaller; its thick spur about the length of the body.

ORDER 31. COMPOSITÆ.

Flowers, usually many in a dense head, sessile, on a common receptacle, surrounded by a calyx-like involucre; the calyx reduced to hairs or scales, or obsolete; the corolla tubular, equally lobed, ligulate or bilabiate, the 5 stamens united by their anthers into a tube inclosing the 2-parted style; the ovary inferior forming in fruit an akene which is usually crowned with the persistent calyx (pappus).

This the largest of all the orders, is represented in California by over 500 species, 140 of which grow within the limits of this Flora. Although the flower heads are frequently large, the separate flowers, with but few exceptions, are too small to be examined without the aid of a microscope skillfully used. The order is, therefore, far too difficult for the beginner.

ORDER LOBELIACEÆ. *Downingia elegans*, *Torr.*, *and D. pulchella*, Torr., are two beautiful plants (the flowers resembling the cultivated *Lobelias*) sometimes cultivated under the name *Clintonia*, which properly belongs to an endogenous herb. The former has light blue flowers; the latter, deep azure-blue; both with white or yellowish centers. May be found in wet places.

ORDER 32. CAMPANULACEÆ.

Herbs with alternate leaves without stipules and regular flowers, having the calyx adnate to the ovary, distinct stamens (5, rarely 4) inserted with the corolla, alternate with its lobes.—Calyx persistent. Stamens with introse anthers, opening in the bud. Style single, its upper portion beset with hairs which collect the pollen, its summit 2–5-lobed or cleft.

* *Ovary and capsule long and narrow.*

Capsule opening at the top; calyx-lobes long..........................**Githopsis.** 1
Capsule opening by 2 or 3 holes on the sides..........................**Specularia.** 2

* * *Ovary and capsule short and broad, or globular.*

Capsule bursting indefinitely; calyx-lobes broad..................**Heterocodon.** 3
Capsule opening on the sides by 3 to 5 holes; calyx-lobes narrow.......**Campanula.** 4

1. GITHOPSIS, Nutt.

Flowers all alike. Calyx with a clavate 10-ribbed tube, and 5 long and narrow foliaceous lobes. Corolla tubular-campanulate, 5-lobed. Filaments short, dilated at the base. Ovary 3-celled; stigmas 3. Capsule strongly ribbed, crowned with the rigid calyx-lobes of its own length or longer, opening between them by a round hole.

1. **G. specularioides,** Nutt. An inch to a span high; leaves lanceolate-oblong or linear, sessile, coarsely toothed; flowers erect, deep blue, usually with a white center; the ovate lobes of the corolla about equaling the rigid calyx-lobes.

2. SPECULARIA. Heister.

Flowers in our species of two kinds; the lower and earlier usually with no corolla, Calyx-tube prismatic or elongated-obconical; the lobes 5, narrow. Corolla short and broad, rotate when fully expanded, 5-lobed. Stigmas 3 or 2. Capsule opening by round holes on the sides.

1. **S. biflora,** Gr. Stems slender; leaves sessile, ovate or oblong, crenately toothed, the upper reduced to lanceolate bracts; flowers 1, rarely 2, in each axil, nearly sessile; the

lower mostly apetalous, with 3 or 4 short calyx-lobes; the upper with 5 longer calyx-lobes, which are shorter than the blue or purple corolla. Capsule with openings near the top.

2. **S. perfoliata**, A. DC. Stouter, with clasping cordate leaves.

3 HETEROCODON, Nutt.

Flowers of two sorts. Stamens and styles as in *Campanula*. Capsule 3-angled. Otherwise sufficiently characterized in the synopsis.

1. **H. rariflorum**, Nutt. A delicate annual, with leafy filiform stems, diffusely branching; the thin leaves clasping by cordate bases, coarsely toothed. Corolla blue.

4. CAMPANULA. Tourn. BELLFLOWER.

Flowers all alike. Calyx-lobes narrow. Corolla campanulate or near it, 5-lobed. Stamens 5; filaments dilated at the base. Capsule 3–5-celled, opening on the sides or near the base by 3 to 5 small uplifting valves leaving round holes.

1. **C. prenanthoides**, Dur. A foot or two high; stems several-flowered; leaves ovate-oblong or lanceolate, sharply serrate, sessile, or the lower short-petioled; lobes of the blue corolla narrowly lanceolate, widely spreading; style long exserted; capsule 5-ribbed.

ORDER 33. ERICACEÆ.

Woody plants or perennial herbs, with symmetrical and mostly regular flowers; the stamens as many or twice as many as the petals or lobes of the corolla, and inserted with but rarely upon it; the anthers 2-celled, and the cells opening by a terminal pore; the ovary with as many cells as the divisions of the corolla or calyx; the seeds small. Corolla generally gamopetalous, sometimes of distinct petals, the insertion and that of the stamens hypogynous, or when the calyx is adnate epigynous around an annular disk. Style single. Leaves simple.

SUB-ORDER 1. VACCINIEÆ.

Shrubs. Ovary wholly or partly inferior. Fruit a berry, crowned with the vestiges of the calyx-teeth.................................**Vaccinium.** 1

SUB-ORDER 2. ERICINEÆ.

Shrubs or trees. Calyx free. Corolla gamopetalous (in our own species). Stamens hypogynous. Anthers introse in the bud.

* *Fruit a berry, or berry-like drupe; corolla-tube inflated or urn-shaped, 5-toothed. Evergreen.*

Tree; ovary 5-celled; berry many-seeded.............................**Arbutus.** 2
Shrub; ovary 5–10-celled; drupe few-seeded.....................**Arctostaphylos.** 3
Shrub; low; berry purple-black.......................................**Gaultheria.** 4

* * *Fruit a naked capsule; corolla funnelform or campanulate, large, 5-lobed.*

Shrubs, with showy flowers.....................................**Rhododendron.** 5

SUB-ORDER 3. PYROLEÆ.

Calyx free. Corolla of 5 (rarely 4) separate petals. Anthers extrose in the bud, the pores downward; introse (by bending downward on the end of the filament) in the open flower, the pores upward.

Stem woody, leaves whorled..**Chimaphila.** 6
Flowers on a scape...**Pyrola.** 7

SUB-ORDER 4. MONOTROPEÆ.

Root-parasitic, scaly-bracted herbs, wholly destitute of green foliage.
Flowers racemose, corolla globular-ovate ....**Pteropspora.** 8

1. VACCINIUM, L. BLUEBERRY, BILBERRY, ETC.

Calyx 4–5-toothed on the summit of the ovary. Corolla various. Stamens 8 to 10; the anthers with the two cells separate, tapering upward into a tube opening at the top. Style long.

1. **V. ovatum,** Pursh. (CALIFORNIA HUCKLEBERRY). Shrub, erect, 3 to 5 ft high; evergreen; leaves thick, shining, ovate, acute, serrate; flowers with the parts in fives, stamens 10; corolla campanulate, pink; berries purple-black.

2. ARBUTUS, Tourn. MADRONO.

Calyx 5-lobed. Corolla ovate, 5-toothed; the teeth recurved. Stamens 10, included; anthers flattened, furnished with a pair of reflexed awns. Style rather long; berry with a rough surface.

1. **A. Menziesii,** Pursh. A handsome tree, with smooth bark turning brownish-red, which exfoliates except on the trunks of the larger trees; corolla white; berries deep orange.

3. ARCTOSTAPHYLOS. Adan. MANZANITA.

Flowers like those of *Arbutus* (but occasionally 4-merous and 8-androus), except that the 5 to 10 cells of the ovary contain each a single ovule, and the berry-like fruit has 5 to 10 bony seeds.—The white or rose-colored flowers in terminal racemes; the bark smooth, exfoliating.

* *Ovary and depressed-globose fruit more or less pubescent; branchlets often hispid.*

1. **A. Andersonii**, Gr. Erect, 6 or 10 ft. high; branchlets minutely tomentose, hispid with long, white, bristly hairs; leaves thin-coriaceous, green, lanceolate-oblong or ovate lanceolate, with a strongly sagittate-cordate base, sessile or nearly so, mostly spinulose-serrulate; fruit nearly or quite half an inch in diameter, with viscid bristles.

2. **A. tomentosa**, Dougl. Leaves thick and very rigid-coriaceous, varying from oblong-lanceolate to ovate and even cordate, entire or rarely serrulate, usually becoming vertical, smaller than the last; flowers in very short clustered racemes; fruit not viscid.

* * *Ovary glabrous; no hispid hairs on the branches and petioles.*

3. **A. pumila**, Nutt. Erect, dwarf, less than a foot high, tufted; leaves broadest near the apex, less than an inch long.

4. **A. pungens**, HBK. Leaves commonly becoming vertical by a twist of the distinct or pretty long petiole, very rigid, often glaucous or pale, entire or with a few teeth, varying from oblong-lanceolate to oval; flowers on smooth pedicels; filaments ciliate, bearded; fruit yellowish, turning dull red. Very variable.

A. GLAUCA, Lindl., if found, may be recognized by its large fruit, with the seeds consolidated into one woody stone, half an inch in diameter. *A. bicolor*, Gr., is smaller and has small apparently one-seeded berries.

4. GAULTHERIA, L. WINTERGREEN. SALAL.

Calyx 5-cleft, generally colored like the corolla. Corolla 5-toothed. Stamens 10 included, similar to those of *Arbutus*. Capsule 5-lobed, 5-celled, many-seeded, inclosed in the calyx, which enlarges and makes a juicy berry-like fruit.

1. **G. Shallon**, Pursh. Shrubby, stems ascending a foot or two in height; leaves ovate or slightly cordate, 2 to 4 inches long, finely serrate, shining; flowers white or rose-colored, in glandular-viscid racemes.

5. RHODODENDRON, L.

Calyx very small. Corolla often slightly irregular. Stamens 5 to 10; filaments filiform. Style long, commonly declined or incurved. Shrubs with alternate, entire leaves, usually crowded on the flowering branchlets; the showy flowers in terminal umbels or corymbs from ample scaly buds.

1. **R. occidentale**, Gr. (AZALEA.) A deciduous shrub, 2 to 6 ft. high; leaves obovate-oblong, bright green and shining above; corolla minutely viscid-pubescent outside, white, the upper lobe yellowish inside; the narrow funnel-form tube equaling the deeply 5-cleft slightly irregular limb; stamens and style much exserted, curved.—The showy fragrant flowers are sometimes nearly three inches long; rarely pinkish.

R CALIFORNICUM, Hook., is a larger evergreen shrub, with large bell-shaped rose-purple flowers a true *Rhododendron*, probably not found south of Mendocino County.

6. CHIMAPHILA, Pursh. PIPSISSEWA.

Corolla of rotately spreading, orbicular and concave petals. Stamens 10. Style very short, inversely conical, nearly immersed in the depressed ovary; stigma broad, its border somewhat 5-crenate.

C. umbellata, Nutt. A nearly herbaceous evergreen, 6 to 18 inches high; the usually whorled leaves oblanceolate, bright green; peduncle bearing 3 to 7 white or flesh-colored, waxy flowers.—Mt. St. Helena, *Miss E. Swett.*

7. PYROLA, Tourn.

Corolla of 5 concave and converging petals. Stamens as in *Chimaphila.* Style generally long; stigma 5-lobed or 5-rayed.—Low and smooth perennial herbs, with broad and petioled leaves, close to the ground, and more or less scaly-bracted scape bearing a simple raceme of white, greenish or rose-colored, nodding flowers.

1. **P rotundifolia,** L. Leaves orbicular, varying to round-obovate or round-reniform, on slender, naked petioles; scape 6 to 14 inches high; probably our plants are of the Var. **bracteata,** Gr. A large form, with leaves 2 or 3 inches long; scape often over a foot high.

2. **P. picta,** Smith. Leaves thick, coriaceous; pale, sometimes purplish below; commonly blotched with white, ovate to obovate and lanceolate-oblong, on short petioles, 1 to 2 inches long; smaller than the last.

8. PTEROSPORA, Nutt.

Calyx deeply 5-parted, short, persistent. Corolla withering-persistent, globular-ovate, with contracted mouth; the 5 very short lobes, recurved. Stamens 10, included, short; stigma 5-lobed.

1. **P. andromedea,** Nutt. A stout, purplish-brown or chestnut-colored and clammy-pubescent herb, 1 to 3 ft. high; raceme long, many-flowered; corolla white, 3 lines long.

SARCODES SANGUINEA, Torr. The SNOW PLANT of the Sierra Nevada belongs here.

ORDER 34. PLUMBAGINACEÆ.

Chiefly maritime herbs, with regular flowers, the parts in fives; the stamens opposite the petals. Calyx tubular or funnel-form, 5-plaited, 5-toothed, persistent. Corolla in our genera with the long-clawed petals scarcely united. Stamens adnate to the base of the petals.

Flowers in a globose head on a simple scape............................Armeria. 1
Flowers on a branching scape..Statice. 2

1. ARMERIA, Willd. THRIFT.

Calyx scarious, funnel-form. Styles 5, filiform. Stemless perennials, with linear grass-like leaves in close tufts, the naked scape bearing a head of rose-colored flowers.

1. **A. vulgaris**, Willd. Scapes a foot or two high. On sandy hills along the coast.

2. STATICE, L. MARSH-ROSEMARY.

Flowers in small spikes or clusters, crowded at the extremities of a branching scape; their structure nearly as in *Armeria*. Leaves commonly with a broad blade, tapering into a petiole.

1. **S. Limonium**, L. Leaves obovate-oblong; spikelets 2–3-flowered. Salt marshes.

ORDER 35. PRIMULACEÆ.

Herbs, with perfect, regular flowers, well marked, by having the stamens as long as the lobes of the corolla, and opposite to them, inserted on its tube, a single entire style and stigma, a one-celled ovary, and capsular fruit. Calyx 4–8-cleft, commonly 5-cleft, hypogynous.—Leaves simple; stipules none. In *Glaux* the corolla is wanting; stamens on the calyx alternate with its lobes.

* *Flowers umbellate on a naked scape.*

Corolla deeply 4–5-parted, the lobes reflexed........................**Dodecatheon.** 1

* * *Flowers axillary, on leafy stems.*

Corolla 5–9-parted, rotate..**Trientalis.** 2
Corolla 5-parted; prostrate stems.......................................**Anagallis.** 3
Corolla wanting; calyx colored...**Glaux.** 4

1. DODECATHEON. L.

Calyx deeply 5-cleft, the divisions reflexed in the flower, afterwards erect over the ovate or oblong capsule. Corolla with a very short tube, a dilated, thickened throat and an abruptly reflexed 4–5-parted limb; its divisions long and narrow, entire. Stamens inserted in the throat of the corolla, erect, cohering around the slender exserted style.—Acaulescent perennial smooth herbs, with a tuft of radical leaves. Corolla purple, pink, or rarely white. Frequently the parts are in fours.

1. **D. Meadia**, L. Leaves varying from obovate to lanceolate, entire or toothed; scape 3 to 15 inches high; umbel, 2–20-flowered. A variable species. Ours is chiefly the

Var. **brevifolium**, with leaves round-obovate or spatulate, less than an inch to an inch and a half long.

2. TRIENTALIS, L. STAR-FLOWER.

Calyx and wheel-shaped corolla about 7-parted. Filaments slender, spreading.—Low and glabrous perennials, with simple stems, which bear a whorl of leaves at the summit, in their axils slender peduncles supporting star-shaped, white or pinkish flowers.

1. **T. Europæa, L., Var. latifolia,** Torr. Stems 4 to 8 inches high, springing from a little tuber.

3. ANAGALLIS, Tourn. PIMPERNEL.

Divisions of the rotate 5-parted corolla broad. Capsule globose.—Spreading, prostrate herbs, with opposite or whorled leaves and axillary flowers.

1. **A. arvensis,** L. Leaves ovate, sessile, shorter than the peduncles, sometimes in threes; flowers scarlet, purple, or nearly salmon-colored, rarely blue.

4. GLAUX, L. SEA MILKWORT.

Calyx campanulate, 5-cleft; the lobes ovate, petal-like. Filaments rather shorter than the calyx. Style filiform; stigma capitate.

1. **G. maritima,** L. Low, glabrous; branching stems 3 to 9 inches high, leafy to the top; leaves commonly opposite, fleshy, oblong, half an inch or less long, minutely dotted; flowers axillary, almost sessile, white or purplish.

ORDER **OLEACEÆ** is represented by *Fraxinus Oregana*, Nutt., the OREGON ASH.

ORDER **APOCYNACEÆ** is represented by *Apocynum cannabinum*, L. (INDIAN HEMP.) An herb with milky juice, tough bark, opposite entire exstipulate leaves, regular flowers, the sepals, petals and stamens five, the latter borne on the corolla alternate with its lobes and conniving around the stigma. The commonly sessile, oblong leaves often 3 or 4 inches long. The greenish-white small flowers in close cymes. *A. androsæmifolium*, L., has smaller ovate leaves, conspicuously petioled; flowers rose-colored.

ORDER 36. ASCLEPIADACEÆ.

Herbs with milky juice, no stipules, and regular flowers, with the parts in fives, except that there are two carpels with distinct ovaries and a common stigma to which the stamens are attached; the latter (in our genera) with hood-like appendages. Leaves entire, generally opposite, sometimes whorled. Flowers usually in simple umbels. Fruit a pair of follicles. Seeds almost always with a coma of silky down.

1. ASCLEPIAS, L. MILKWEED.

The calyx and corolla deeply 5-parted; the small divisions reflexed; filaments short, crowned behind each anther with a conspicuous hood from the cavity of which rises the subulate and usually falcate horn; anthers with thin scarious tips inflexed over the truncate summit of the stigma, their wing-like edges meeting and projecting between the hoods; pollen in 10 wax-like masses. Follicles ovate or lanceolate. Seeds numerous, flat, downwardly imbricated all over the large, soon detached placenta; the upper end with a long tuft of down (coma).—Hoods in our species erect and not exceeding the stamens and stigma.

1. **A. fascicularis**, Decaisne. Smooth, slender, 1 to 5 ft. high; leaves in whorls of 3 to 5, or some in pairs, linear and linear-lanceolate; flowers white or whitish; horns longer than the hoods.

2. **A. vestita**, Hook & Arn. White-woolly; leaves opposite, ovate-lanceolate or oblong-lanceolate, almost sessile; umbels almost sessile; flowers about half an inch long, the hoods flesh-colored.

2. GOMPHOCARPUS, R. Br.

No horn to the hood of the stamens; otherwise as *Asclepias*.

§ 1. *Hoods saccate, pointless, lower than the anthers, opening down the back, as if 2-valved.*

1. **G. tomentosus**, Gr. White-tomentose, closely resembling *Asclepias vistitia;* stem acutely angled; leaves ovate or oblong (about 4 inches long); corolla greenish-white or purplish.

2. **G. purpurascens**, Gr. Canescently puberulent; stems 4 to 12 inches high; leaves ovate and somewhat cordate, an inch or two long; flowers small; the corolla red-purple; the hoods white.

§ 2. *Hoods erect, open down the front, somewhat surpassing the anthers.*

3. **G. cordifolius**, Benth. Green and smooth, 2 or 3 ft. high; leaves ovate or ovate-lanceolate, with cordate clasping base, opposite, rarely in threes, 2 to 5 inches long; flowers large; corolla dark red-purple; the hoods purplish.

ORDER 37. GENTIANACEÆ.

Glabrous herbs, with colorless, bitter juice, entire opposite and sessile leaves, no stipules, perfect and regular flowers, stamens as many as the lobes of the corolla and alternate with them, inserted on the tube, the anthers free from the stigma; ovary 1-celled; style one or none; the stigmas commonly two. Calyx persistent.

§ 1. *Corolla withering-persistent. Leaves opposite or whorled, entire, sessile.*

Corolla salver-form, red; calyx 5-parted.............................**Erythræa.** 1
Corolla short, salver-form, yellow; caylx 4-toothed....................**Microcala.** 2
Corolla funnel-form, blue..**Gentiana,** 3

§ 2. *Corolla deciduous. Leaves alternate, with sheathing petioles.*

Flowers borne on a naked scape.......................................**Menyanthes,** 4

1. ERYTHRÆA, Pers.

Stamens inserted on the throat of the corolla; filaments slender; anthers oblong or linear, twisting spirally after shedding the pollen. Style filiform; stigma wedge-shaped or fan-like. Capsule oblong, tapering upward.—Corolla occasionally only 4-parted.

1. **E. trichantha**, Grise. A span or less high, branched; lobes of the rose-red corolla lanceolate, fully half the length of the tube at the time of expansion, 3 or 4 lines long; calyx-lobes filiform, 3-angled.

2. **E. Muhlenbergii**, Grise. Two inches to a span high, simple or branched; leaves oblong, half an inch long; lobes of the corolla oval, very obtuse, becoming oblong, rose-red.

2. MICROCALA, Link.

Anthers round-cordate. Stigma peltate-dilated, at length separating or separable into 2 plates.

1. **M. quadrangularis**, Grise. An inch or two high, filiform, simple and 1-flowered, or branched at the base, with 1 to 3 pairs of minute oval or oblong leaves; peduncles naked, square; calyx short, square; corolla saffron-yellow.

3. GENTIANA, L. Gentian.

Calyx 4–5-toothed or cleft. Corolla 4–5-lobed, often with plaited and toothed folds in the sinuses. Stamens included; anthers sometimes cohering. Style none or very short; stigmas 2, thin and flat.

1. **G. affinis**, Grise., var. **ovata**, Gr. A span to a foot or two high; leaves ovate or oblong; flowers mostly 5 or more, in a leafy thyrsus; corolla blue, an inch or more in length; appendages mostly 2-cleft or 2–4-cuspidate, shorter than the round-ovate lobes.

4. MENYANTHES, Tourn. Buckbean.

The campanulate corolla densely white-bearded on the upper surface, the lobes with the margins turned inward in the bud.

1. **M. trifoliata**, L. The alternate leaves long petioled, 3-foliolate; scape terminated by a short raceme of white or pinkish flowers; anthers dark-brown, sagittate.—In shallow water or on wet ground.

Order 38. POLEMONIACEÆ.

Chiefly herbs with simple or divided leaves, and no stipules; all the parts of the regular flower five, except the pistil, which has a 3-celled ovary and a 3-lobed style. Calyx imbricated in the bud, persistent. Corolla convolute in the bud. Stamens on the corolla alternate with its lobes distinct; anthers introse.—In *Gilia* the cells of the ovary and the stigmas are occasionally reduced to two.

Leaves various but never simply pinnate with entire leaflets................Gilia. 1
Leaves simply pinnate; leaflets linear to ovate; corolla short..........Polemonium. 2

1. GILIA. Ruiz & Pav.

Corolla funnel-form, salver-form, or sometimes short-campanulate or rotate, regular. A polymorphous genus, the sections having almost generic differences.

SERIES I. Stamens attached to the corolla at unequal heights.

Mostly viscid-pubescent or glandular; all but some of the lower leaves alternate; stamens exserted. § *Collomia.*

SERIES II. Stamens equally inserted, but sometimes with unequal filaments.

* *All of the leaves opposite, at least on the main stems, sessile and palmately parted or rarely entire. (Seeds mucilaginous in water.)*

Corolla from short funnel-form to almost rotate; the lobes obovate; filaments slender; anthers oval. Low or slender, loosely and mostly small flowered annuals; the leaves with filiform or setaceous divisions, appearing as if whorled. In ours, the flowers on filiform pedicels, loosely paniculate. § 1. *Dactylophyllum.*

Corolla salver-form, but the tube shorter than the calyx, the broad cuneate-obovate lobes slightly crenulate, strongly convolute in the bud; stamens inserted low on the corolla tube, included; erect, smooth; leaves entire or 3–5-divided. § 2. *Linanthus.*

Corolla salver-form, with usually a filiform elongated tube, and the throat sometimes abruptly dilated; stamens inserted in the throat; anthers short. Erect annuals, with leaves as in the last, and the flowers in a terminal capitate cluster. § 3. *Leptosiphon.*

* * *All the leaves alternate and palmately parted.*

Corolla similar to § 3. Stems woody; leaves much fascicled in the axils, 3–7 parted, rigid; flowers sessile, solitary or few at the ends of short branches. § 4. *Leptodactylon.*

* * * *All, or all but the lowest leaves alternate and pinnately compound, cleft or toothed, or rarely entire.*

Flowers capitate-glomerate or densely clustered, leafy-bracted; bracts and calyx-lobes often laciniate, rigid acerose or spinulose-tipped. Corolla slender tubular-funnelform, with small oblong lobes; cells of the ovary and stigmas sometimes only 2. Annuals, mostly viscid-pubescent, never white-woolly, with once or twice pinnatifid leaves, their lobes commonly pungent; the bracts sometimes palmately cleft. § 5. *Navarretia.*

Flowers, inflorescence, etc., nearly as in § 5; but the anthers always exserted; corolla salver-form, more conspicuous; plants all white-woolly, not viscid. § 6. *Hugelia.*

Flowers capitate-glomerate, or panicled, or scattered, usually bractless; corolla (blue, purple or violet) from funnel-form to campanulate or almost rotate; stamens included or not surpassing the corolla lobes; leaves most pinnately incised. § 7. *Eugilia.*

§ *Collomia.* [See p. 138.]

* *Leaves simple, sessile, entire, lower ones often opposite.*

1*a*. **G. grandiflora**, Gr. Erect, a foot or two high; leaves linear to lance-ovate; calyx-lobes broad and obtuse; corolla buff or salmon-color, narrow-funnel-form, an inch long. The showy flowers are in leafy-bracted heads.—Sonoma County, Lake County, *E. Brooks*. *Collomia grandiflora*, Dougl. of 4th Ed.

1*b*. **G. gracilis**, Gray. A span or two high, in age much branched; the flowers at length somewhat scattered; leaves lanceolate or linear, or the lowest oval or obolate, an inch or less long; corolla rose-purple, turning bluish, less than half an inch long, narrow. *Collomia gracilis*, Dougl. of previous editions.

* * *Leaves, deeply cleft or compound, the lower petioled; stems loosely branched.*

1*c*. **G. divaricata**, Nutt. A span to 3 ft. high; lower leaves simply pinnately parted into linear lateral lobes, or the terminal lobe oblong and toothed, upper leaves 3–5-divided; corolla pink or purplish, its slender tube about half an inch long, twice or thrice the length of the calyx; capsule globular, 3-seeded. *Collomia gilioides*, Benth.

1*d*. **G. Sessei**, Don. A span or two high, diffuse; leaves mostly pinnately parted or the upper pinnatifid, and the lobes incised or cleft; the upper most often entire and broader, subtending the capitate-clustered flowers; corolla purplish, half an inch long; stamens very unequally inserted. *Collomia heterophylla*, Hook.

§ 1. *Dactylophyllum.* Benth.

1. **G. liniflora**, Benth. From a few inches to over a foot high; leaves with nearly filiform divisions an inch long; corolla white, rotate, when fully open, 10 to 6 lines across, 5-parted down to the very short tube.

Var. **pharnaceoides**, Gr., is similar but smaller; the (sometimes pinkish) corolla half an inch across, or less.

2. **G. pusilla** Benth. Small, 2 to 6 inches high; leaves less than half an inch long, shorter than the scattered pedicels; corolla nearly white, or purplish with a yellow throat, 1½ to 2 lines long, little exceeding the calyx.

Var. **Californica**, Gr., has a corolla 3 lines long, twice the length of the calyx; the throat often brownish. The most frequent form.

3. **G. Bolanderi**, Gr. Very like the last, but the tube of the blue or purple tinged corolla longer and narrower (3 or 4 lines long).

4. **G. aurea**, Nutt. Diffuse, 2 to 4 inches high; divisions of roughish leaves narrowly linear, 3 lines long; peduncles shorter or but little longer than the flowers; corolla usually yellow, short, funnel-form half an inch or less across; the roundish-obovate lobes about the length of the obconical throat and the short proper tube.

Var. **decora**, Gr. Corolla white or pale violet, with or without a brown-purple throat; peduncles longer.

§ 2. *Linanthus*, Endl.

5. G. **dichotoma**, Benth. A span to a foot high, remotely leaved; flowers nearly sessile in the forks, or terminating the branches; calyx-tube white scarious; the teeth green; corolla white; the lobes from half to nearly an inch long; the tube sometimes purplish.

§ 3. *Leptosiphon*, Endl.

6. G. **densiflora**, Benth. A span to 2 ft. high; leaves in somewhat distant apparent whorls; tube of the white or rose-purple corolla about equaling the villous-hirsute bracts and calyx; its lobes nearly half an inch long, obovate.

7. G. **androsacea**,* Steud. Erect or spreading, 3 to 12 inches high; corolla lilac, rose, pink or almost white, with a yellow or dark throat; its tube about an inch long.

Var. **rosacea**, Gr., is a dwarf tufted form with many rose-red flowers.

8. G. **micrantha**, Steud. Slender, about a span high; tube of the corolla very slender, 9 to 18 lines long; the lobes 2 or 3 lines long, from yellow to cream color and pale purple, or whitish.

9. G. **tenella**, Benth. Low and mostly depressed; tube of the corolla 6 to 9 lines long, the rose colored or pink lobes barely a line and a half long, the throat yellow; bracts and leaves hispidulous-ciliate.

10. G. **ciliata**, Benth. More rigid and hirsute than the preceding, a span to a foot high; tube of the rose-colored or purple, or in age whitish corolla, little if at all exserted beyond the very hirsute or hispid-ciliate bracts and subtending leaves, the lobes only a line and a half long.

§ 4. *Leptodactylon*, Hook & Arn.

11. G. **Californica**, Benth. Two or three feet high, with spreading rigid branches; corolla rose-color or lilac, an inch and a half in diameter.

§ 5. *Navarretia*, Gr.

* *Stamens included in the throat of the corolla.*

12. G. **squarrosa**, Hook & Arn. Rigid, rather stout, becoming much branched, very glandular-viscid, fetid with the odor of a skunk; upper leaves and bracts spinescent; corolla blue, 4 or 5 lines long.

* * *Stamens more or less exserted; corolla slender, 3 to 5 lines long. Leaves twice pinnatifid.*

13. G. **cotulæfolia** Steud. Rather stout and rigid, a foot or much less in height; villous pubescent and minutely glandular; upper bracts spinescent; tube of the violet or whitish corolla hardly longer than the calyx; capsule usually 1-seeded. Exhales the odor of *Anthemis cotula* (MAYWEED).

14. G. **intertexta**, Steud. At length diffusely much branched, a span high, neither

viscid nor glandular; stems retrorsely pubescent; leaves mainly smooth, scarcely bipinnatifid; base of the bracts and tube of the calyx densely white-villous; corolla white.

15. **G. leucocephala**, Gr. A span high, rather slender, loosely branched, smooth, except a little woolliness at the top; leaves soft; bracts hardly pungent; heads dense; corolla white, longer than the calyx.

* * * *Stamens exserted; leaves only once pinnatifid, rigid, linear; corolla violet or purple, barely half an inch long, about twice the length of the pungent calyx-lobes.*

16. **G. viscidula**, Gr. A span high or less, at length much branched, viscid-pubescent; bracts palmately cleft.

17. **G. atractyloides**, Steud. Much more rigid than the last; leaves broader, the floral ovate, all with subulate spiny lobes; few flowered.

§ 6. *Hugelia*, Benth.

* *Root perennial; stems woody at the base.*

18. **G, densifolia**, Benth. A foot or two high; stems leafy, leaves linear, rigid, the short lobes subulate; flowers numerous in a compact head; corolla over half an inch long, violet blue, exceeding the calyx, the lobes 3 lines long; anthers sagittate.

* * *Root annual, stems slender, a foot or less in height; leaves and their few (if any) divisions filiform.*

19. **G. virgata**, Steud. Tube of the blue corolla longer than the calyx; anthers sagittate.

Var. **floribunda**, Gr. Low and rather stout; even the upper leaves pinnately 3–7-parted; the numerous heads and flowers as large as *G. densifolia*.

§ 7. *Eugilia*, Benth.

* *Flowers numerous in dense head-like clusters on long naked peduncles; stems erect; stamens inserted in the very sinuses of the short and broad corolla; leaves twice or thrice pinnately dissected into linear divisions.*

20. **G. capitata**, Dougl. Mostly smooth; stem slender, loosely branched above, a foot or two high; lobes of the light blue (rarely white) corolla narrowly oblong, 2 lines long.

21. **G. achilleæfolia**, Benth. Stouter and lower than the last, often glandular; the capitate clusters and flowers larger; calyx woolly; lobes of the deeper blue corolla broad.

* * *Flowers in small, rather loose clusters, or scattered in an open panicle.*

22. **G. multicaulis**, Benth. A span to a foot high, simple in early plants, loosely branched in later; flowers few in a cluster terminating the slender naked peduncles, almost sessile; the violet corolla 4 lines long, tube shorter than the viscid calyx; throat funnel-form; capsule ovoid.

Var. **tenera**, Gr., is a depauperate form; frequently the peduncles only 1-flowered.

23. **G. tricolor**, Benth. A span to a foot or two high, in age diffusely branched; flowers few, in loose, rather short peduncled clusters; corolla with a very short proper tube and an ample campanulate throat which is pale yellow or orange below, dark purple above; the lilac or violet lobes longer than the stamens.

24. **G. inconspicua**, Dougl. A span to a foot high, somewhat viscid or glandular; corolla violet-purple or bluish, twice or thrice the length of the calyx, but small, the lobes only a line long. It passes by gradation into

Var. **sinuata**, Gr., with the tube of the corolla more slender and exserted and the lobes often 2 lines long.

2. POLEMONIUM. Tourn.

Flowers as in *Gilia*, § *Eugilia*, but the corolla short and broad, the stamens somewhat declined, the filaments hairy appendaged at the base. Calyx herbaceous, its divisions and those of the pinnate leaves pointless.

1. **P. cæruleum**, L. (GREEK VALERIAN.) Smooth or viscid-pubescent, 2 or 3 ft. high, leafy, usually bearing numerous flowers; corolla an inch or more across, bright blue varying to white; stamens and style exserted. [See bottom of p. 122.]

ORDER 39. HYDROPHYLLACEÆ.

Inflorescence usually scorpioid; flowers perfect, regular, 5-androus, the two styles distinct at least at the apex; stigmas terminal, small, capitate. Only in *Romanzoffia* are the stigmas as well as the styles united. Ovary commonly hispid or hirsute, at least at the top.—Mostly herbs, with alternate or rarely opposite leaves and no stipules.

Tribe 1. HYDROPHYLLEÆ. Ovary and capsule 1-celled. Style 2-cleft. Corolla almost always convolute in the bud. Herbs.

Flowers solitary or loosely racemose.

Calyx with reflexed appendages	**Nemophila.**	1
Calyx naked at the sinuses	**Ellisia.**	2

Tribe 2. PHACELIEÆ. Ovary 1–2-celled. Style 1–2-cleft. Corolla imbricated in the bud. Calyx naked at the sinuses. Herbs.

Corolla not yellow, deciduous	**Phacelia.**	3
Corolla yellow, persistent	**Emmenanthe,**	4
Style and stigma entire	**Romanzoffia.**	5

Tribe 3. NAMEÆ. Ovary, capsule, dehiscence, etc., nearly of *Phacelieæ*. Styles distinct to the base, stigmas capitate.

Low shrubs	**Eriodictyon.**	6

1. NEMOPHILA, Nutt.

Calyx 5-parted. Corolla rotate-campanulate, deeply 5-lobed, the throat appendaged with 10 internal plates or scales.—Tender herbs with diffuse and procumbent stems, and pinnately lobed or divided leaves, more or less hirsute.

* *Leaves mostly alternate; stems long and weak, beset with stiff reflexed bristles.*

1. **N. aurita,** Lindl. Leaves large, with auriculate dilated and clasping base or winged petiole deeply pinnatifid into 5 to 9 retrorse lobes; corolla violet, 5 to 12 lines in diameter.

* * *Leaves opposite not auricled at base.*

2. **N. maculata,** Benth, Leaves lyrately pinnatifid into 5 to 9 short lobes, or the uppermost only 3-lobed; corolla white, with a violet spot at the top of each lobe, over an inch across.

3. **N. insignis,** Dougl. Leaves similar to the last; corolla bright blue, its scales short and roundish, partly free.

4. **N. Menziesii,** Hook & Arn. Leaves less divided than the last; corolla from light blue to white and sprinkled with dots toward the center, its scales narrow and adherent by one edge.

* * * *Upper leaves often alternate, mostly longer than the peduncles, and slender-petioled, many only 3–5-lobed, one-sided.*

5. **N. parviflora,** Dougl. Slender and weak; corolla 2 to 5 lines across, light blue or white.

2. ELLISIA, L.

Calyx 5-parted. Corolla campanulate, short in proportion to the calyx; scales minute or obsolete. Stamens and style not exserted.

1. **E, chrysanthemifolia,** Benth. Stem 1 or 2 ft. high, erect, branched; leaves dissected into very many small and short divisions; flowers, small, white; capsule remarkable, viz.: the mostly four ordinary rough seeds enclosed between the placentæ, while, between each placenta and the valve which it lines, is hidden a single thin, meniscoidal, smooth seed.

3. PHACELIA, Juss.

Calyx deeply 5-parted, the divisions usually narrow and similar; corolla from almost rotate to narrow-funnelform; commonly with appendages upon the inside of the tube in the form of 10 vertical plates, approximate in pairs between the bases of the filaments, or adnate to the filaments, one on each side. Stamens equally inserted low down or at the base of the corolla. Herbs, mostly hirsute or hispid and branched from the base; with simple or compound alternate leaves, or the lower opposite and more or less scorpioid infloresence. Corolla never yellow except in the throat. Ovules and seeds 4 in all except the last species. (See ADDENDA.)

* *Leaves simple and entire, or with a pair or two of similar and smaller leaflets or lobes.*

1. **P. circinata,** Jacq. f. A span to a foot or two high from a stout root, hispid and the foliage strigose, either green, grayish or canescent, with a soft pubescence; leaves from lanceolate to ovate, acute, the lower tapering into a petiole and some bearing lateral leaflets; inflorescence in dense scorpioid hispid spikes, crowded; corolla dull or bluish white; filaments much exserted.—A very variable species; usually many stems from one root; some with large entire, ovate green leaves only.

2. **P. Breweri,** Gr. Foliage and habit similar to the last, but smaller and more slender, from an annual root; leaves seldom an inch long, many of them 3–5-parted, the lanceolate lateral lobes ascending; corolla smaller (scarcely 3 lines long), blue or violet; filaments not exserted.

* * *Leaves simple, rounded, cordate, lobed and serrate.*

3. **P. malvæfolia,** Cham. Stout, loosely branching, hispid with stinging hairs; leaves 2 inches or more in diameter; spikes solitary, or in pairs; corolla 3 to 6 lines long, dull white or bluish; stamens much exserted.

* * * *Leaves once to thrice pinnatifid or pinnately compound, oblong in general outline. Calyx bristly hispid, its lobes not rarely unequal. Annuals, the species difficult to discriminate.*

4. **P. tanacetifolia,** Benth. Erect, 1 to 3 ft. high, roughish, hirsute or hispid; leaves 9–17-divided in narrow once or twice pinnately parted or cleft divisions, all sessile or nearly so; the scorpioid spikes clustered; the short pedicels erect or ascending; corolla usually of a dirty mottled white or bluish; stamens and style much exserted; calyx lobes not twice the length of the capsule.

5. **P. ramosissima,** Dougl. Straggling, somewhat viscid above; leaves pinnately 5–7-divided or parted into linear pinnatifid-incised divisions; the short pedicels soon horizontal; stamens and style moderately exserted; calyx lobes more than twice the length of the globular capsule; flowers bluish.

6. **P. ciliata,** Benth. A span to a foot high; leaves rarely divided but incised or cleft and toothed; spikes simple or in pairs; stamens usually not surpassing the open corolla; calyx lobes ciliate with glandular bristles; corolla blue.

* * * * *Leaves entire, or the lower 1–2-lobed, not cordate, the veins parallel or converging, as in P. circinata; no glandular pubescence; calyx with long hairs; seeds more than 4.*

7. **P. divaricata,** Gr. Diffusely spreading, a span or more in height; leaves ovate or oblong; style 2-cleft at the apex only; corolla violet, about 10 lines in diameter.

4. EMMENANTHE, Benth.

Distinguished from *Phacelia* by the persistent yellow or cream-colored corolla.

1. **E. penduliflora**, Benth. A span to a foot high; somewhat viscid; leaves pinnatifid; pedicels filiform, about half an inch long, equaling the nodding corolla.

5. ROMANZOFFIA, Cham.

Stamens unequal; style filiform. Low perennial herbs, with the aspect of saxifrages; the leaves mainly radical, round-cordate, or reniform, crenately 7-11-lobed, long petioled.

1. **R. Sitchensis**, Bong. Scapes weak, a span long, bearing several pink or purple, varying to white flowers; corolla veiny.

6. ERIODICTYON, Benth.

Calyx deeply 5-parted. Corolla funnel-form to salver-form. Stamens included.—Low shrubs; the leaves alternate, of rigid coriaceous texture, the finely reticulated veinlets conspicuous on a fine woolly ground, at least underneath, their margins beset with rigid teeth.

1. **E. glutinosum**, Benth. (MOUNTAIN BALM, or YERBA SANTA.) Smooth, glutinous with a resinous exudation, 3 to 5 ft. high; leaves lanceolate, 3 to 6 inches long; cymes in a naked panicle; corolla tubular, funnel-form, violet or nearly white, half an inch long.

E. tomentosum, Benth., grows farther down the coast. It is larger with smaller almost salver-form flowers; densely villous.

ORDER 40. BORRAGINACEÆ.

Mostly roughly pubescent herbs, with alternate entire leaves without stipules, scorpioid inflorescence, and perfectly regular 5-androus flowers; the ovary of 4 lobes or divisions around a central style, ripening into seed-like nutlets. Calyx free, 5-parted or 5-cleft, persistent. Corolla with a 5-lobed limb, commonly imbricated in the bud. Stamens distinct, inserted in the tube or throat of the corolla alternate with its lobes. The one-sided and coiled apparent spikes or racemes straighten as the blossoms develop.

All our species except the first belong to the true Borrage Tribe.

* *Fruit not prickly.*

Corolla with plaited sinuses; stigma sessile	**Heliotropium.**	1
Corolla yellow. Bristly-hispid plants	**Amsinckia.**	2
Corolla white	**Eritrichium.**	3

* * *The nutlets prickly, bur-like.*

Flowers sky-blue (rarely white) in bracteate racemes	**Echinospermum.**	4
Flower purple, blue and violet in a peduncled raceme	**Cynoglossum.**	5
Flowers minute; nutlets winged, or boat-shaped	**Pectocarya.**	6

1. HELIOTROPIUM, Tourn.

Corolla with plaited sinuses. Filaments short or none; anthers connivent and sometimes cohering. Style entire or none; stigma a fleshy ring or the edge of a peltate or umbrella-shaped disk. Fruit dry, splitting into 4 nutlets.

1. **H. Curassavicum**, L. A smooth and somewhat glaucous succulent herb with spreading or prostrate stems; leaves oblanceolate, an inch or two long; flowers crowded, white or blue; stigma sessile, flat-topped. Blackens in drying.

2. AMSINCKIA, Lehm.

Corolla salver-form, or somewhat funnel-form, more or less plaited in the bud at the sinuses, with the tube exceeding the calyx, lobes rounded. Filaments short. Style filiform; stigma capitate-2-lobed. Nutlets ovate-triangular. Hispid annuals with oblong-ovate to linear leaves, and yellow flowers in at length loose scorpioid spikes or racemes, without bracts, except sometimes the lowest.

* *Nutlets rough, the back convex.*

1. **A. spectabilis**, Fisch. & Mey. Erect, a span to a foot high; leaves mostly linear; tube of the bright orange-yellow corolla, two or three times the length of the linear, rusty-hispid calyx, nearly half an inch long; the throat enlarged, and the expanded limb a third to half an inch in diameter.

2. **A. intermedia**, Fisch. & Mey. Erect, usually a foot or two high; leaves linear or only the lower lanceolate; corolla bright yellow, 3 or 4 lines long; its tube a little surpassing the calyx-lobes; the limb 2 or 3 lines in diameter.

3. **A. lycopsoides**, Lehm. Loosely branched, soon spreading, sometimes decumbent, sparsely hispid with bristles, which on the leaves have conspicuous pustulate bases; leaves from lanceolate to ovate, the margins usually undulate; upper flowers mostly bractless; corolla light yellow, about 4 lines long; the throat little enlarged; the limb 2 or 3 lines in diameter. Passes into

Var. **bracteosa**, Gr., a smaller-flowered decumbent form, with most of the flowers bracteate.

* * *Nutlets nearly flat on the back, coarsely granulate.*

4. **A. tessellata**, Gr. About a foot high, rather stout, coarsely hispid, the bristles of the calyx rusty; corolla orange-yellow, 3 or 4 lines long, the throat plaited, the tube rather longer than the obtuse calyx-lobes; nutlets broadly ovate, thickly covered with warty granulations closely fitting like the blocks of a pavement.

* * * *Nutlets at maturity, whitish, smooth and polished.*

5. **A. vernicosa**, Hook & Arn. Sparsely bristly; leaves linear to ovate-lanceolate; corolla light yellow, 4 or 5 lines long, and the limb narrow; nutlets shaped like a grain of buckwheat.

Var. **grandiflora**, Gr. Robust, more hispid and large flowered, the limbs broader; calyx lobes often combined, so as to appear as 3 or 4.

3. ERITRICHIUM, Schr.

Most obviously distinguished from *Amsinckia* and the nearer *Echinospermum* by its usually smaller white flowers, with shorter corolla tube. The species difficult of determination.

1. **E. Californicum**, DC. The slender stems decumbent, a span or more long; the leaves narrowly linear; stems flowering from near the base; flowers almost sessile, mostly with leaves or bracts, at length scattered; the corolla only a line long; calyx open in fruit. Passes into

Var. **subglochidiatum**, Gr. Slightly succulent; lower leaves inclined to spatulate, nutlets somewhat barbed. Wet ground.

2. **E. Scouleri**, A.DC. Slender, erect a span to a foot high; leaves narrowly linear (1 or 2 inches long); flowers in geminate or sometimes paniculate slender naked spikes, most of them bractless; pedicels not more than a line long; calyx erect in fruit; corolla surpassing the calyx, the limb almost rotate, 2 to 5 lines in diameter.—Seems to pass into the next.

3. **E. Chorisianum**, DC. At first erect, soon spreading or decumbent; larger leaves, 2 to 4 inches long; flowers in lax, usually solitary racemes, many of them leafy-bracted; pedicels sometimes filiform and 2 to 9 lines long; corolla more funnel-form, its limb 3 to 5 lines in diameter.—This may be a wet ground form of the last, which grows on dry ground.

4. **E. fulvum**, A.DC. A span to a foot high, slender branched from a leafy base, pubescent; leaves linear, or the lower lanceolate or spatulate; spikes at maturity nearly filiform, bracteate only at the base; calyx, etc., densely clothed with rusty or fulvous hairs; calyx deciduous, only the lower part remaining under the fruit; corolla limb 2 lines across.

5. **E. canescens**, Gr. Stouter and larger than the last; the pubescence whitish, not rusty; leaves linear; calyx hardly deciduous.

6. **E. oxycaryum**, Gr. May be known by the solitary ovate-acuminate, smooth, shining nutlet enclosed in the persistent bur-like calyx; corolla 2 lines wide.

4. ECHINOSPERMUM, Swartz.

Calyx lobes spreading or reflexed in fruit. Corolla short, salver-form, and with conspicuous arching crests at the throat. Short filaments, style, etc., as in *Eritrichium*. Nutlets with barbed prickles.

1. **E. floribundum**, Lehm. Rather strict, 2 ft. or more high, or sometimes smaller; leaves from oblong to linear-lanceolate; racemes numerous, usually geminate; the tri-

angular nutlets armed with prickles on the margins; limb of the rotate corolla 2 to 5 lines in diameter, blue, rarely white.

5. CYNOGLOSSUM, Tourn.

Chiefly distinguished from the preceding by the broad large leaves, the bractless racemes and the nutlets clothed over the whole back with stout barbed prickles.

1. **C. grande**, Dougl. About 2 ft. high, pubescence soft; radical and lower stem leaves ovate oblong, usually rounded or cordate at the base, long petioled; panicled racemes or cymes small, on a long naked terminal peduncle; corolla tube exceeding the calyx; its limb blue to violet, with usually purple crests; 3 to 5 lines wide.

6. PECTOCARYA, DC.

Structure of the minute white flowers similar to the preceding; nutlets widely spreading in pairs, horizontal, oblong or almost linear, surrounded by an incurved wing-like border which is toothed, the apex beset with hooked bristles.

1. **P. penicillata**, A. DC. Very slender, diffusely branching, spreading, with narrow linear leaves, and small flowers scattered the whole length of the stem, on very short pedicels; nutlets only a line long.

ORDER 41. CONVOLVULACEÆ.

Herbs, usually twining or trailing, with alternate leaves (or scales) and regular perfect flowers; the stamens as many as the lobes or angles of the corolla and alternate with them (5, rarely 4); the free persistent calyx of mostly distinct imbricated sepals; ovary 2-3-celled; capsules generally globular; seeds 1 to 4. Inflorescence axillary.

Corolla plaited in the bud; style single............................**Convolvulus.** 1
Corolla 5-cleft; styles 2...**Cressa.** 2
Twining parasites, leafless, yellowish....................................**Cuscuta.** 3

1. CONVOLVULUS, L.

Corolla campanulate or short and open funnel-form, with a 5-angulate or obscurely 5-lobed border, deeply plaited down the sinuses in the bud. Stamens included. Style filiform; stigmas 2, in ours flat, from linear to oval. (See ADDENDA.)

* *A pair of bracts close to the calyx, enveloping it.*

1. **C. Soldanella**, L. Maritime, low, smooth; stems a foot or less in length; trailing; leaves reniform entire or obscurely angulate-lobed, an inch or two broad, long petioled; corolla pink, purplish, or nearly white.

2. **C. occidentalis**, Gr. Mostly smooth; stems twining several feet high; leaves from broadly ovate-triangular with a deep and narrow basal sinus to narrowly lanceolate-hastate; the posterior lobes often 1–2-toothed; peduncle elongated, not rarely 2-flowered within the bracts; these ovate or rarely oblong, commonly surpassing the enclosed calyx; corolla white or pinkish, 1 to 1½ inches broad; stigmas linear.

3. **C. Californicus**, Choi. Minutely and rather densely pubescent, a span or less high, or with trailing stems a foot long; leaves from ovate or obovate and obscurely hastate to triangular-hastate, the basal lobes sometimes 1–2-toothed, long-petioled; peduncles shorter than the petiole; bracts oblong or oval, about equaling the sepals, or shorter; corolla white, cream-color or flesh-color, 1½ to 2 inches long.

4. **C. villosus**, Gr. Densely silky-villous or woolly; corolla cream colored, an inch long.

* * *No calyx-like bracts; sometimes a pair of leaves close under the flower or a pair of bracts at some distance below it.*

5. **C. luteolus**, Gr. Stems twining several feet long; leaves triangular-hastate or sagittate, the basal lobes sometimes 2-lobed; peduncles bearing a pair of linear or lanceolate entire bracts, a little below the flower; a second flower occasionally from the axil of one of them; corolla pale yellow or purplish, an inch or more in length; stigmas linear.

2. CRESSA, L.

Corolla deeply 5-cleft; the oblong or ovate lobes more than half the length of the somewhat campanulate tube. Stamens and the 2 distinct styles exserted. Stigmas capitate.

1. **C. Cretica**, L. A span or two high, silky-villous and hoary; leaves very numerous, 2 to 4 lines long, almost sessile; flowers sessile or nearly so in the upper axils; corolla 2 or 3 lines long, white.—On saline or alkaline soil.

3. CUSCUTA, Tourn. DODDER.

Calyx 5–4-cleft or parted. Corolla campanulate or short-tubular, the spreading limb 5–4-parted. Styles in our species 2, distinct. Seeds germinating in the soil, but the thread-like, branching, leafless, yellowish or reddish twining stems becoming parasitic on the bark of herbs or small shrubs; being attached by means of suckers. Flowers small, cymose or densely clustered, white or whitish.

* *Capsule depressed-globose.*

1. **C. Californica**, Choisy. Flowers pedicelled in loose few-flowered cymes; lobes of the calyx acute; lobes of the corolla lanceolate-subulate, delicate white; no scales below the stamens.

Var. **breviflora, Engel.** Flowers scarcely over a line long; calyx lobes equaling the corolla-tube.

Var. **longiloba**, Engel. Flowers 1½ to 2½ lines long; calyx-lobes often with recurved tips; capsule mostly only 1-seeded, enveloped by the withered corolla.

* * *Capsule pointed, capped or enveloped by the withered corolla.*

2. **C. salina**, Engel. Flowers 1½ to 2½ lines long delicate white; corolla lobes often overlapping, denticulate; capsule surrounded but not capped by the corolla, usually 1-seeded.—Growing in saline marshes, usually on *Salicornia.*

3. **C. subinclusa**, Dur. & Hilg. Flowers sessile or nearly so (at length in large clusters), 2½ to 4 lines long; lobes of the corolla short, the tube somewhat urn-shaped, only partly covered by the fleshy, usually reddish calyx.—The most common species growing on coarse herbs and shrubs.

ORDER 42. SOLANACEÆ.

Herbs or shrubs, with alternate leaves and no stipules, regular 5-merous flowers on bractless pedicels, a single style and a 2-celled ovary; the fruit a many-seeded berry or capsule.

This small order of, perhaps, not more than a dozen species west of the Sierra Nevada, and less than 70 in North America, is remarkable for the diversity of properties exhibited by its members, and the almost universal use by man of several of its species. At first view, the classification seems absurd which puts fiery Cayenne pepper and insipid egg plants, the wholesome tomato and deadly night-shade, nutritious potatoes and poisonous tobacco together in one family. A careful examination shows that these seemingly very different plants are much alike after all. The four most important plants of this order—potato, tobacco, red or Cayenne pepper, and tomato—are natives of tropical America, and were consequently not used in the Old World before the sixteenth century. The following ornamental plants of the order are common in cultivation: Jerusalem Cherry (*Solanum Pseudo-Capsicum*), a small shrub, with red berries; Jasmine Solanum (*S. Jasminoides*), a shrubby climber, with a profusion of nearly white blossoms a little smaller than those of the potato; the well-known Matrimony Vine (*Lycium vulgare*); Tree Datura or Stramonium (*Datura arborea*), with hanging flowers six or seven inches in length; *Cestrum*, a shrub with drooping tubular red flowers in terminal bunches; and *Petunia*, with funnel-form corollas of various colors.

Solanum Xanti, Gray, grows along the coast from Santa Barbara southward, and has been reported from Lake County. It is more herbaceous than *S. umbelliferum*, and may be distinguished with the aid of a lens by its simple glandular hairs, instead of the branching hairs of the latter species.

Physalis or Ground Cherry may be found in cultivated ground. Its berries are enclosed by an inflated calyx.

Datura Meteloides, DC., grows on the Salinas River and southward. The flowers are white or violet tinged, and 6 to 8 inches long, with a wide border; the capsule nodding.

Corolla rotate; fruit a berry...Solanum. 1
Corolla funnel-form; capsule large, spiny..Datura. 2
Corolla funnel-form; capsule smooth...Nicotiana. 3

1. SOLANUM, Tourn.

Lobes of the corolla valvate in the bud. Filaments short; anthers usually conniving. Style elongated.

* *Corolla small white; deeply 5-cleft.*

1. **S. nigrum**, L. (BLACK NIGHTSHADE.) Widely branching; leaves usually ovate and sinuate toothed; flowers in umbellate clusters; berries black. Variable.

Var. **Douglasii**, Gr. Leaves apt to be coarsely toothed; flowers sometimes half an inch broad.

* * *Corolla large, blue, 5-angled.*

2. **S. umbelliferum**, Esch. Somewhat shrubby; flowers in umbel-like clusters, violet-blue to rarely white, about 9 lines broad. A variable species similar to *S. Xanti*, which is less shrubby and has larger flowers, a common species farther south.

2. DATURA, L. STRAMONIUM.

Calyx prismatic, partly deciduous. Corolla with ample 5-pointed limb. Style long; stigma 2-lipped. Capsule spiny.

1. **D. Stramonium**, L. Smooth, green; corolla white, about 3 inches long; capsule beset with short, stout prickles, the lower shorter.

2. **D. Tatula**, L. Stem reddish-purple; corolla pale violet; prickles about equal.

3. **D. quercifolia**, HBK. Green; corolla violet-tinged; prickles flattened, unequal, some an inch long.—Lower Russian River.

3. NICOTIANA, Tourn. TOBACCO.

Calyx campanulate or oblong, persistent. Corolla commonly funnel-form, the limb plaited. Style long; stigma capitate, somewhat 2-lobed.—Very viscid herbs.

1. **N. rustica**, L. Leaves petioled, ovate, or the lower slightly cordate; corolla short and broad, dull white, less than an inch long.

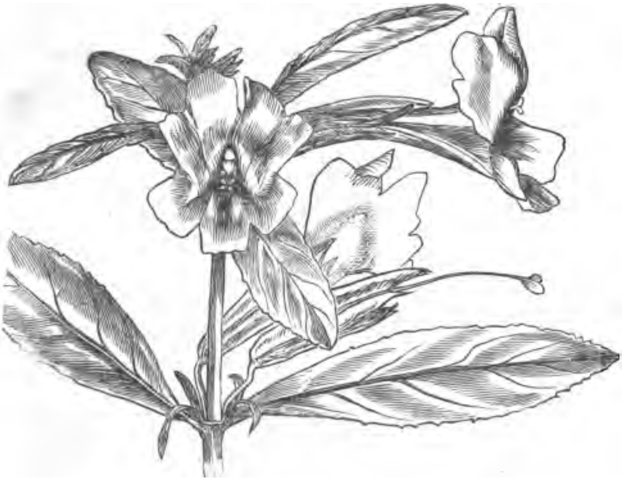
2. **N. Bigelovii**, Wat. Leaves oblong or oblong-lanceolate, only the lower ones petioled, these scarcely exceeding 6 inches long; corolla nearly salver-form with tube 1½ inches long, the limb an inch or more wide, its lobes acute.

3. **N. attenuata**, Torr. (SLENDER TOBACCO.) Leaves petioled, the lower ovate or oblong, the upper lanceolate to linear lanceolate; calyx teeth short; corolla greenish white, salver-form, an inch or more long, and a half an inch or less across. Slender plants 3 or 4 feet high in cultivated ground.

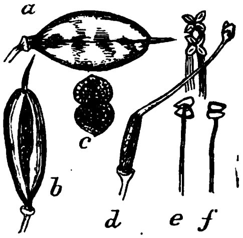
4. **N. glauca**, Graham. (TOBACCO TREE.) A small tree, commonly cultivated; smooth, glaucous leaves long-petioled; tubular corolla greenish yellow, an inch or more long.

ORDER 26. SCROPHULARIACEÆ.

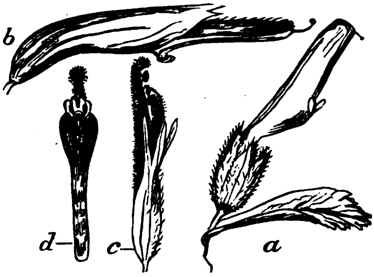
A corolla more or less bilabiate, with the lobes imbricated in the bud; didynamous or diandrous stamens; a single style and a 2-celled ovary and capsule mark this large order. In *Pentstemon* there is a fifth rudimentary stamen. *Verbascum* has five perfect stamens.



Mimulus glutinosus.



a. Ripe capsule of Mimulus luteus. *b.* The same seen edgewise bursting open. *c.* A cross section of the same, showing the placentæ and seeds. *d.* Pistil of Mimulus luteus. *e.* Front view of one of the anthers. *f.* Back view of the same. Above these are the stamens of Mimulus glutinosus united in pairs.



a. Single flower and bract of Pedicularis densiflora (galea flattened laterally, the pistil protruding; the lower lip of 3 small lobes, 2 of which are shown). *b.* A single flower of Castilleia. *c.* Single flower of Orthocarpus purpurascens. *d.* Front view of the same, with calyx removed. The lower lip (anterior or front part of the flower), 3-lobed, the galea beaked and surpassing the stigma.

This large order, numbering nearly 2,000 species, is remarkable for the great beauty of its flowers, and for the impartial distribution of its species over the whole world. Over 300 species, belonging to 37 genera, are natives of the United States. About 75 species grow east of the Mississippi, and about 100 west of the Sierra Nevada in this State. The most important American genera are Pentstemon, 75 species, found, with one exception, only in North America, and mostly within the limits of the United States between the Rocky Mountains and the Sierra Nevada; Mimulus, represented in other countries, but most largely in North America, where there are 30 species, about two thirds of which grow in California, west of the Sierra Nevada, only 2 species reaching the Atlantic States; Orthocarpus, 24 species, all North American, except one, and west of the Mississippi, 16 belonging to California; Gerardia, 24 species, mostly in the Atlantic States, and none reaching the Rocky Mountains; Castilleia, 23 species, 2 Asiatic, 3 in the Atlantic States, and 8 or 9 in California; Pedicularis, a large genus, mostly in the arctic regions and on high mountains of the temperate zone, 28 American species; Collinsia, 15 species, all Californian, except two, which grow in the Mississippi Valley. Several showy species of shrubby Veronicas are cultivated. This large genus, numbering 40 species in New Zealand alone, is represented in the United States by only a few obscure herbs. Digitalis, commonly cultivated under the name of Foxglove, has run wild about Humboldt Bay and in the Willamette Valley.

Many plants belonging to the genera Pentstemon, Collinsia, and Mimulus are cultivated on account of their beautiful flowers. Pentstemons are mostly confined to hilly or mountainous districts. Collinsias grow everywhere. Most species of Mimulus prefer moist places, but the only shrubby species, *M. glutinosus*, grows on dry, rocky hillsides.

Two species of *Verbascum* (*Mullein*) are found in the State, but probably not within our limits; *V. Thapsus*, L., with woolly decurrent leaves and *V. virgatum*, Withe., distinguished by nearly smooth not decurrent leaves and violet bearded filaments.

* *Leaves mostly alternate; corolla personate.*

Corolla spurred at base..Linaria. 1
Corolla gibbous at base..Antirrhinum. 2✓

* * *Leaves opposite or whorled.*

Corolla erect, the anterior lobe reflexed, the other 4 erect, a scale in the throat on the upper side..Scrophularia. 3
Corolla declined, the middle lower lobe infolding the stamens and style...Collinsia. 4✓
Carolla with a fifth sterile filament on the upper side.... ....Pentstemon. 5✓
Stigma 2-lipped or disk-like..Mimulus. 6✓

* * * *Corolla rotate or short-campanulate.*

Calyx 5-toothed; corolla campanulate..Limosella. 7
Calyx 4-parted; corolla 4-lobed, rotate..Veronica. 8

* * * * *Corolla tubular; the upper lip erect or incurved, laterally compressed, usually enclosing the ascending stamens.*

Corolla narrow with almost obsolete lower lip..........................Castilleia. 9✓
Corolla with saccate lower lip of 3 lobes..........................Orthocarpus. 10✓

Lips of corolla, both short; the lower 3-crenulate..................**Cordylanthus.** 11
Upper lip of the corolla arched; many large radical leaves............**Pedicularis.** 12

1. LINARIA, Tourn.

Calyx 5-parted. Corolla with the throat nearly closed; the base in front (below) prolonged into a spur.

1. **L. Canadensis**, Dum. (TOAD FLAX.) Smooth; leaves linear, alternate on the erect flowering stems, but smaller and broader ones often opposite or whorled on the procumbent shoots; flowers blue in a terminal raceme.

2. ANTIRRHINUM, Tourn. SNAPDRAGON.

Like *Linaria,* except that the corolla has a saccate protuberance instead of a spur. In ours the upper lip is spreading and the lower lobes deflexed.

1. **A. glandulosum**, Lindl. Glandular and viscid; leaves lanceolate, mostly sessile; flowers in a dense spike or raceme, half an inch or more long, pink with yellowish palate.

2. **A. vagans**, Gr. Very diffuse, often glandular, branchlets frequently prehensile; leaves short, lanceolate to ovate; flowers scattered, purplish blue, half an inch long.

Var. **Bolanderi**, Gr. Has broader and thinner leaves, those on the prehensile branchlets orbicular.

3. **A. Breweri**, Gr. Has smaller flowers, only 3 lines long; style strongly deflexed.

3. SCROPHULARIA, Tourn. FIGWORT.

Calyx deeply 5-cleft, the lobes broad. Corolla short, with an oblong tube unequally 5-lobed, 4 erect, the two upper the longer. Stamens 4, inserted in pairs, low down on the corolla tube, a rudiment of the fifth stamen in the form of a scale above. Coarse herbs, with inconspicuous flowers.

1. **S. Californica**, Cham. Nearly smooth, 2 to 6 ft. high, with deltoid or truncate-ovate doubly toothed opposite leaves; flowers small greenish or lurid red (rarely yellow) in a terminal thyrsus.

4. COLLINSIA, Nutt.

Calyx deeply 5-cleft. Corolla with the tube gibbous or saccate on the upper side, commonly declined, conspicuously bilabiate; the upper lip 2-cleft, and its lobes recurving; the lower 3-lobed and larger, its side lobes pendulous-spreading, the middle one folded into a keel-shaped sac and including the declined stamens and style. Stamens in pairs, with long filaments, anthers round-reniform. A gland at the base of the corolla on the upper side answers to the fifth stamen.—Beautiful annuals with simple opposite or whorled leaves, all but the lower sessile; pedicels solitary or whorled in the axils of leaves which diminish to small bracts above.

* *Flowers short-pediceled or nearly sessile, verticillate.*

1. **C. bicolor**, Benth. A foot or more high; leaves oblong-lanceolate, the upper usually ovate-lanceolate and sessile by a nervose veined base; pedicels shorter than the acute lobes of the calyx; the lower lip or the corolla violet or rose-purple and the upper paler to nearly white; the saccate throat very oblique to the true tube, fully as broad as long; gland short.—The most showy species, with flowers nearly an inch long.

2. **C. tinctoria**, Hartw. Foliage, etc., like the preceding; generally more viscid-pubescent; flowers almost sessile; corolla yellowish, cream-color, or white, usually with purple dots or lines; upper lip very short.—East side of Sacramento Valley.

3. **C. bartsiæfolia**, Benth. Puberulent and somewhat glandular; leaves from ovate-oblong to linear; flower-whorls 2 to 5, rarely only one; the lateral lobes of the lower lip emarginate or obcordate; gland elongated. Flowers nearly as large as the preceding, purplish, pale violet, or whitish; upper lip with a transverse callosity at the origin of the limb.

4. **C. Greenei**, Gr. Upper lip of the violet purple corolla about half the length of the lower, crested below with a pair of callous teeth on each side connected by a ridge. Corolla 5 lines long.—Lake County.

* * *Flowers on slender pedicels, solitary or umbellate-whorled.*

6. **C. sparsiflora**, Fisch. & Mey. Slender; upper leaves linear-oblong or linear-lanceolate, merely opposite or the upper minute floral bracts in threes; pedicels solitary in the axils, longer or shorter than the flower which is 4 to 8 lines long; corolla mostly violet; the upper lip and the middle lobe of the lower commonly yellowish and purple-dotted; calyx usually purple-tinged.

7. **C. parviflora**, Dougl. Low, at length diffuse about a span high; the blue, or partly white flowers solitary or 2 to 5 in a whorl, 2 to 4 lines long; stigma cleft, gland capitate, short-stipitate.

5. PENTSTEMON, Mitch.

Calyx 5-parted. Corolla with a conspicuous mostly elongated or ventricose tube; the limb more or less bilabiate; upper lip 2-lobed; the lower 3-cleft, recurved or spreading.—The conspicuous sterile filament strongly marks the genus, remarkable for its many beautiful species. (See ADDENDA.)

1. **P. Menziesii**, Hook. Tufted at the woody base, a span to a foot high; leaves oval or ovate, a half to an inch long; corolla about an inch long, pink-red; anthers with the diverging cells long-woolly. Mt. St. Helena, *Mrs. M. L. Swett.*

2. **P. corymbosus**, Benth. A foot or two high, soft-pubescent or nearly smooth, leafy to the tip; corolla scarlet, an inch long; anthers smooth; steril filament, bearded down one side.

3. **P. breviflorus**, Lindl. 3 to 6 ft. high, with long, slender, flowering branches; corolla yellowish with flesh-color, striped within with pink, about half an inch long; the upper lip beset with long viscid hairs; sterile filament naked.

4. **P. Lemmoni**, Gr. Is smaller and may be distinguished from the last by its yellow bearded sterile filament.

5. **P. heterophyllus**, Lindl. Stems 1 to 5 ft. high from a woody base; leaves lanceolate or linear; corolla an inch or more in length, ventricose, rose-purple or pink changing to violet, an inch or more in length. Difficult to distinguish from the next.—Coast Range.

6. **P. azureus**, Benth. Usually smaller than the last; the larger corolla azure blue changing to violet; the base sometimes reddish; the expanded limb sometimes an inch broad.—Sierra Nevada.

6. MIMULUS, L.

Calyx mostly plicately 5-angled. Corolla funnel-form, with the included or rarely exserted tube bilabiately 5-lobed; the lobes roundish, more or less spreading or the upper turned back; a pair of ridges running down the lower side of the throat. The anthers often approximate in pairs, their cells divergent. The lobes of the stigma commonly petaloid-dilated or peltate-funnelform.—Flowers axillary on simple peduncles; commonly showy.

1. **M. tricolor**, Lindl. Stem, when beginning to flower, only a quarter of an inch high, at length 3 inches. Corolla about 1½ inches long, with a long exserted slender tube, a short funnelform throat, and similar nearly equal lobes; pink, with a crimson spot on the base of each lobe, a yellow stain along the lower lip. Leaves sessile.

2. **M. Douglasii**, Gr. Similar to the last; leaves contracted into a petiole; lower lip of the corolla much shorter than the erect upper one or even obsolete; the throat more ample. Stem from a ½ to 6 inches high.

3. **M. glutinosus**, Wendl. A brittle-stemmed shrub, 2 to 6 ft. high, with thick glutinous-sticky leaves and mostly buff or salmon-colored flowers, but running into varieties with red, red-brown, or scarlet flowers.

4. **M. cardinalis**, Dougl. Villous, with viscid hairs; the large leaves ovate, the upper often connate; corolla frequently 2 inches long; the tube hardly exceeding the long calyx, the limb very oblique, scarlet.—Along water courses.

5. **M. luteus**, L. Mostly smooth, varying greatly in size from a foot to even 4 ft. high; leaves ovate oval or cordate; corolla deep yellow, usually spotted within, and the base of the lower lip blotched with brown-purple, from 1 to 2 inches long. Moist ground.

6. **M. inconspicuus**, Gr. Smooth, 2 to 7 inches high; the ovate or lanceolate leaves sessile, a half inch or less long; corolla 5 lines long, yellow or rose-color; calyx teeth very short.

7. **M. moschatus**, Dougl. (Musk Plant.) Very villous and usually musk-scented; stems spreading and creeping; flowers yellow.—Our form is chiefly

Var. **longiflorus**, Gr., with very clammy leaves and flowers an inch long, scarcely musky.

3. **M. pilosus**, Wat. A span to a foot high, much branched, soft, villous and slightly viscid, many flowered from near the base; leaves lanceolate to narrowly oblong, sessile, entire; calyx tube not prismatic; corolla yellow, obscurely bilabiate, 3 or 4 lines long, usually a pair of brown-purple spots on the lower lobe.

7. LIMOSELLA, L. MUDWORT.

Calyx campanulate. Corolla rotate-campanulate, nearly regular. Style short; stigma thickish.—Diminutive annuals, with narrow fleshy leaves in clusters around the 1-flowered scapes. Flower small, white or purplish.

1. **L. aquatica**, L. An inch to a span high, growing in brackish mud or in fresh water.

8. VERONICA, L.

The lower lobe and sometimes the lateral ones of the rotate corolla sometimes smaller than the others. Stamens 2, one on each side of the upper lobe of the corolla. Capsules compressed. Flowers small (a line or two broad), in racemes or spikes, or solitary in the axils; blue, purplish, or white.

1. **V. Americana**, Schw. Stems a span to two feet long; leaves ovate or oblong, serrate, rather succulent, short-petioled, an inch or two long, opposite. Flowers in axillary racemes, bluish, with purple stripes. Common in damp places.

2. **V. peregrina**, L. A span or more high, all the upper leaves alternate, linear-oblong; flowers minute, in the axils of the leaves, and mostly narrow bracts; capsule obcordate.

9. CASTILLEIA, Mutis. PAINTED-CUP.

Calyx tubular, more or less cleft in front or behind, or both; the lobes 2 and lateral, or 4. Corolla tubular, laterally compressed, especially the long upper lip (galea); the lower lip very short or minute, 3-toothed, and somewhat saccate below the short teeth; the tube usually inclosed in the calyx. Stamens 4, inclosed in the galea; anthers 2-celled, the long cells unequal, the outer fixed by the middle, the inner ones smaller, pendulous. Style long; the capitate stigma sometimes 2-lobed. Herbs, sometimes woody at the base, with mostly alternate, sessile leaves, the floral ones or their tips, as well as the calyx lobes, commonly petaloid and colored red, yellow, or white. Flowers in terminal, simple, leafy spikes.

1. **C. affinis**, Hook. & Arn. Annual; a foot or two high; leaves narrowly lanceolate, entire; the upper floral bracts usually broader, the apex toothed, red; spike with scattered, frequently pedicellate flowers below; calyx red; an inch long, its front fissure hardly twice as deep as the back one, the narrow lobes acutely 2-cleft; corolla 1 to 1½ inches long, exserted so as to expose the callous lip; the galea about equal to the tube, yellowish or tipped with red.

2 **C. latifolia**, Hook. & Arn. Perennial (as are all the following); branching from

the base, 1 or 2 ft. high, villous-hirsute and viscid; leaves oval, obtuse, half an inch or more long, some above 3-5-lobed and red; calyx 2-cleft to the middle, the lobes entire or emarginate, almost equaling the corolla; corolla 8 lines long, the short teeth of the lip inflexed.

3. **C. parviflora**, Bong. A span to 2 ft. high, villous-hirsute above; leaves variously cleft into linear or lanceolate lobes, or sometimes the cauline are mainly entire and narrow; calyx lobes oblong and 2-cleft at the apex or to below the middle; corolla an inch or less long; only the upper part of the narrow galea exserted—A variable species. As in the preceding species, the bracts and calyx are usually colored red or crimson, but sometimes varying to yellow or even white.

4. **C. miniata**, Dougl. Commonly 2 ft. high, strict, often slender; leaves lanceolate or linear-lanceolate, almost always entire, the broad floral ones of the close spike sometimes incised or 3-cleft, usually bright red, rarely whitish; calyx lobes lanceolate, acutely 2-cleft; corolla over an inch long, exserted, exposing the short ovate teeth of the lip.

5. **C. foliolosa**, Hook. & Arn. Densely white-woolly, the matted hairs loosened with age; many-stemmed from a woody base; leaves narrowly linear, an inch or less long, crowded below and fascicled in the axils.

10. ORTHOCARPUS, Nutt.

Chiefly distinguished from *Castilleia* by the upper lip of the corolla (galea) which but little, if at all, surpasses the usually more conspicuous and inflated 1–3-saccate lower lip.

§ 1. CASTILLEIOIDES, Gr.—*Lower lip of the corolla simply or somewhat triply saccate, and bearing* 3 *conspicuous teeth; the galea broadish or narrow; stigma capitate; anthers al 2-celled; bracts with colored tips.*

* *Filaments smooth; galea straight or nearly so, naked, narrow; the lip moderately ventricose; its teeth erect.*

1. **O. attenuatus**, Gr. Slender, strict, a span or two high, mostly simple; leaves linear and attenuate, often with a pair of filiform lobes; spike slender; lower flowers scattered; bracts with slender lobes barely white-tipped; corolla narrow, half an inch long, white or whitish; narrow teeth of the purple-spotted lip nearly equaling the galea.

2. **O. densiflorus**, Benth. Erect or diffusely branched from the base 6 to 12 inches high; spike dense, many flowered, at length cylindrical, or lowest flowers rather distant; bracts 3–cleft, about equaling the flowers, their linear lobes purple and white; corolla from 8 to 12 lines long, the tips usually purplish, the teeth of the lip shorter than the galea.

3. **O. castilleioides**, Benth. At length diffuse and corymbosely branched; leaves from lanceolate to oblong, usually laciniate; the upper and the bracts cuneate-dilated and incisely cleft, green or the obtuse tips whitish or yellowish; spikes dense, short and thick: corolla nearly an inch long, dull white or purplish-tipped; lip ventricose-dilated.

* * *Filaments pubescent; galea densely red-bearded; the obtuse tip incurved.*

4. **O. purpurascens**, Benth. Bracts and corolla usually crimson to rose-color. Distinguished by the bearded, hooked galea, and large stigma.

§ 2. TRIPHYSARIA, Benth.—*Lower lip of the corolla conspicuously 3-saccate, and very much larger than the slender galea, its teeth small, the tube filiform; stigma capitate, sometimes 2-lobed; bracts like the leaves and not colored.*

5. **O. pusillus**, Benth. Small and weak or diffuse, branched from the base, 3 or 4 inches high; leaves 1–2-pinnatifid, and bracts 3–5-parted into filiform divisions; flowers scattered, inconspicuous, shorter than the bracts; corolla purplish, 2 or 3 lines long; lip moderately 3-lobed; galea soon exposing the stamens.

6. **O. floribundus**, Benth. Slender, erect, 4 to 12 inches high; spike many-flowered, dense above; corolla white or cream-color, half an inch long; the tube twice the length of the calyx; stamens about the length of the soon open galea; the lip with 3 divergent oval sacs, their scarious teeth erect.

7. **O. erianthus**, Benth. Erect, a span or more high, much branched, pubescent; corolla sulphur-yellow, with the slightly falcate galea brown-purple; tube 6 to 8 lines long, filiform, densely pubescent, thrice the length of the calyx; the lip of 3 globular-inflated sacs, 1 to 2 lines long; the galea subulate, inclosing the stamens more strictly than the preceding.

Var. **roseus**, Gr. Corolla rose-purple, shorter.

8. **O. faucibarbatus**, Gr. Nearly smooth, less branched, and leaves with coarser divisions than the last; corolla with smaller sacs and less beard within the lip; the straight galea pale.

9. **O. lithospermoides**, Benth. Hirsute above; stem 4 to 12 inches high, strict, mostly simple, very leafy; bracts of the dense many-flowered spike about equaling the flowers; corolla an inch or less long, cream-color, often turning pale rose-color; sacs 3 lines deep; the teeth inconspicuous; anthers 2-celled.

11. CORDYLANTHUS. Nutt.

Calyx of an anterior and a posterior leaf-like division, or the former wanting. Corolla tubular, a little enlarging upward; the lips short and of nearly equal length; the lower very obtusely and crenulately 3-toothed; the upper straight and compressed, with the apex incurved. Style mostly hooked at the tip.—Branching annuals with alternate narrow leaves either entire or 3–5-parted; the floral ones not brightly colored. Flowers one to each bract, dull-colored, yellowish or purplish; the corolla not much exceeding the calyx.

§ 1. ADENOSTEGIA, Gr.—*Calyx 2-leaved; flowers short pediceled or nearly sessile, subtended by 2 to 4 bractlets; floral leaves and bracts tipped with a gland.*

1. **C. filifolius**, Nutt. A foot or two high; leaves filiform; the lower entire, t

upper 3–5-parted, the floral with cuneate base and ciliate margins; corolla purplish, 6 to 9 lines long.

2. **C. pilosus**, Gr. Larger, soft-villous and hoary; the floral leaves 3-toothed at the tip; corolla yellowish with some purple, less than an inch long.

§ 2. HEMISTEGIA, Gr.—*Calyx 1-leaved; flowers without bractlets, each sessile in the axil of a clasping bract; no glands at the tips of the leaves.*

3. **C. maritimus**, Nutt. Leaves smooth, somewhat fleshy, all entire; flowers in a capitate spike; corolla dull-purplish; pairs of filaments very unequal.—In salt marshes.

4. **C. mollis**, Gr. Stamens only 2, with smooth filaments; the upper leaves toothed or pinnatifid.—Salt marshes.

12. PEDICULARIS, Tourn.

Calyx 2–5-toothed, irregular. Corolla strongly bilabiate; the galea arched and laterally compressed; the lip 2-crested above, 3-lobed. Stamens 4, inclosed in the galea; anthers transverse, equally 2-celled.

1. **P. densiflora**, Benth. Nearly smooth, stout, becoming a foot or more high; leaves broad-lanceolate in outline, twice-pinnatifid or pinnately parted, and the divisions irregularly and sharply incised or toothed; the upper bracts of the dense elongated spike or raceme simpler; calyx-teeth, 5; corolla red or scarlet.

ORDER 44. OROBANCHACEÆ.

Root-parasitic herbs, destitute of leaves and green color. Distinguished from *Scrophulariaceæ* by the 1-celled ovary.

1. APHYLLON, Mitch.

Calyx 5-cleft, or 5-parted, regular or nearly so. Corolla tubular and curved, almost regular, or bilabiate. Stamens included; cells of the anthers deeply separated from below upward, mucronate at base. Stigma peltate or bilamellar.—Low pale or brownish herbs; the flowers yellowish or purplish.

* *Scapes or peduncles naked; corolla with an almost regular 5-lobed border.*

1. **A. uniflorum**, Gr. Coralla about an inch long, bluish purple, violet-scented.

2. **A. fasciculatum**, Gr. Scaly stem rising out of the ground 2 or 3 inches, bearing many peduncles; lobes of the calyx not longer than the tube; flowers dull yellow or purplish.

* *Stems rising above the ground; flowers bracteate; corolla plainly bilabiate.*

3. **A. comosum**, Gr. Low, branching at or near the surface of the ground; flowers

on slender pedicles in a corymb or short raceme; corolla rose-purple or purple, an inch or more long, or twice the length of the deeply parted calyx; anthers woolly.

4. **A. Californicum**, Gr. Flowers crowded in an oblong thyrsus or raceme; calyx lobes nearly equaling the tube of the yellowish or purplish corolla; anthers smooth or nearly so.

5. **A. tuberosum**, G. Flowers small, sessile in a compact cluster; yellowish.

Boschniakia strobilacea, Gr., if found may be known by its resemblance to a spruce cone, 3 or 4 inches long, the flowers striped with white and brownish red; scale-like bracts brown.

ORDER 45. LABIATÆ.

Chiefly aromatic herbs with square stems, opposite simple leaves, and no stipules, bilabiate corolla, didynamous or diandrous stamens, and a 4-lobed ovary with a single style, forming seed-like nutlets in the bottom of the persistent calyx.—Flowers perfect, axillary. Calyx 3-5-toothed or cleft, or bilabiate. Stamens on the tubes of the corolla. Style, 2-cleft at the apex; often unequally so, or one of the lobes obsolete; stigmas minute.

Tribe 1. SATUREIEÆ. Stamens erect or ascending; the posterior pair shorter or wanting; anthers 2-celled, and the short lobes never far separated, sometimes partly confluent but not blended. Upper lip of the corolla never hooded; all the lobes flat or nearly so.

* *The small corolla about equally 4-lobed; tube naked within.*

Stamens 4, nearly equal .... **Mentha.** 1
Stamens 2, with anthers; posterior pair sterile or wanting .... **Lycopus.** 2

* * *Corolla bilabiate; no hairy ring within the base of the tube.*

+ *Calyx about equally 5-toothed and 13-nerved; style beardless.*

Flowers glomerate-capitate. Stamens 4, straight.
Stamens distant and divergent.................................. **Pycnanthemum.** 3
Stamens exserted .... **Monardella.** 4

Flowers solitary or clustered in the axils.
Stamens 4, curving, shorter than the corolla........................ **Micromeria,** 5

+ + *Calyx unequally and deeply 5-cleft, mostly 15-nerved; style bearded above.*

Stamens 4, sometimes the upper pair sterile.......................... **Pogogyne.** 6

* * * *Corolla not manifestly bilabiate; a hairy ring at the base of the tube within.*

Shrubby. Flowers large, campanulate.................................. **Sphacele.** 7

Tribe 2. MONARDEÆ. Stamens only 2, fertile, the upper pair rudimentary or wanting; anthers apparently or really of a single linear-oblong cell, or of 2 cells widely separated upon the ends of a filament-like connective.

Connective longer than the filament itself, which it strides, a narrow anther-cell at its upper end, a smaller one or a long process at the lower........**Salvia.** 8

Connective much shorter than the slender filament and continuous or barely articulated with its apex, or apparently none; anther 1-celled, no rudiment of the second cell below...................................**Audibertia.** 9

Tribe 3. STACHYDEÆ. Stamens 4, with anthers, ascending and parallel under the concave or galeate upper lip of the corolla. Calyx 5-10-nerved. Herbage less aromatic than the preceding tribes.

Calyx with a projection on the upper side, casque-shaped ....**Scutellaria.** 10

Calyx bilabiate. Filaments 2-forked, one fork bearing the anther.......**Brunella.** 11

Calyx 5-10-nerved, nearly equally 5-toothed...........................**Stachys.** 12 dokeford

Tribe 4. AJUGOIDEÆ. Stamens parallel, and protruding from the cleft on the upper side of the corolla; the anterior longer.

Corolla with 5 similar oblong lobes...............................**Trichostema.** 13

1. MENTHA, L. MINT.

Calyx about equally 5-toothed. Corolla with a short included tube, and a campanulate border; the upper lobe broadest, entire or emarginate. Odorous herbs, with very small flowers in dense clusters forming an apparent whorl in the axils or spikate at the tops of the branches.

1. **M. Canadensis**, L. Leaves from oblong-ovate to almost lanceolate, sharply serrate, acute, short-petioled; flowers all in axillary clusters, whitish or purplish.

2. LYCOPUS, Tourn. WATER HOREHOUND.

Chiefly distinguished from **Mentha** by the stamens. Flowers white, in false whorls.

1. **L. lucidus**, Turcz., var. **Americanus**, Gr. The subterranean runners producing tubers; leaves lanceolate, 2 to 4 inches long, coarsely serrate, sessile or nearly so.

3. PYCNANTHEMUM, Michx.

Corolla short, with tube hardly exceeding the calyx. Anther-cells close and parallel. Perennial erect herbs with small flowers.

1. **P. Californicum**, Torr. About 2 feet high, corymbosely branched, sweet-odorous, whitened with soft pubescence, or in age smoothish: leaves from ovate to ovate-lanceolate, closely sessile by a slightly cordate or roundish base, sparingly denticulate or entire; heads of flowers very dense at the summit, white-villous; flowers whitish.

4. MONARDELLA, Benth.

Marked by the flowers compacted in terminal heads involucrate with bracts, flesh-color or purple.

* *Perennial, in tufts from a procumbent and almost woody base.*

1. **M. villosa,** Benth. Soft-pubescent or villous a foot or two high; leaves ovate, often with a few obtuse teeth, being 6 to 10 lines long, petioled. Sometimes nearly smooth.

* * *Annual; leaves entire or undulate.*

2. **M. undulata,** Benth. A span to a foot or more high; leaves from oblong spatulate to nearly linear with a narrowed base, obtuse, undulate-margined, about an inch long; bracts and calyx villous; corolla rose-color. Has the odor of Peppermint.

3. **M. Breweri,** Gr. A span or more high; leaves oblong or ovate, pinnately veined, the larger an inch long; bracts broadly ovate, cuspidate, whitish-scarious, the outer pinnately and the inner nervosely 7–9-ribbed; corolla rose-purple.

4. **M. Douglasii,** Benth. Loosely branched; leaves lanceolate, an inch long, tapering into the petiole; the silvery white or purple-tinged bracts mostly transparent, with a strong marginal vein connected with the midrib by pinnate veins.—Strong-scented; corolla deep rose-color.

5. MICROMERIA, Benth.

Calyx not gibbous. Corolla short; upper lip erect, flattish, entire or emarginate; lower spreading, 3-parted.—Low plants, sweet-odorous, with small axillary flowers.

1. **M. Douglasii,** Benth. YERBA BUENA. Perennial herb, with long slender creeping and trailing stems; leaves round-ovate, thin, sparingly toothed, short petioled, an inch long or less; flowers mostly solitary on a long filiform 2-bracteolate peduncle; corolla purplish or white, 4 lines long.

2. **M. purpurea,** Gr. Erect, much branched; leaves lanceolate, acuminate, sparsely serrate; flowers in umbel-like clusters; corolla purple-blue, 2 lines long.

6. POGOGYNE, Benth.

Calyx cleft to below the middle; the 2 lower teeth longer; corolla straight, tubular-funnelform, with short lips; the erect and entire upper lip and the three lobes of the spreading lower one oval and somewhat alike. Stamens with the upper shorter pair sometimes sterile; the anther cells parallel and pointless. Style somewhat exserted, bearded above.—Low annuals, sweet-aromatic; with oblong or oblanceolated leaves narrowed into a petiole; flowers mostly crowded and interrupted spicate; bracts and calyx hirsute-ciliate; the corolla blue or purplish.

* *Stamens all four with anthers; style conspicuously bearded above, and its subulate lobes almost equal; corolla 6 to 9 lines long; flowers densely crowded into an oblong cylindrical spike, which is conspicuously white-hirsute with the long, stiff, ciliate hairs of the calyx.*

1. **P. Douglasii,** Benth. Rather stout, a span to a foot high; leaves veiny, some-

times sparingly toothed; bracts linear, acute; lower lobes of the calyx much longer than the others.

2. **P. parviflora**, Benth. Smaller; bracts mostly obtuse; corolla 5 or 6 lines long.

* * *Upper stamens sterile; style sparingly hairy, its lobes very unequal; flowers barely 2 lines long.*

3. **P. serpylloides**, Gr. Stems 3 to 6 inches high; leaves obovate-oval or spatulate, 2 or 3 lines long; lower flowers remote and often solitary; the upper usually interruptedly spicate.

7. SPHACELE, Benth.

Calyx thin, membranaceous and reticulated. Corolla with 5 broad, rather erect lobes, the lower one longest. Anther cells diverging. Somewhat shrubby, veiny-leaved.

[illegible]

S. calycina, Benth. Villous-pubescent or tomentose, leafy, 2 to 5 ft. high; leaves 2 to 4 inches long, ovate or oblong crenate or serrate, or almost entire; the floral, ovate-lanceolate, sessile; flowers an inch long, mostly solitary in the upper axils, purplish or lead-color.

8. SALVIA, L. Sage.

Calyx bilabiate. Corolla deeply 2-lipped, the upper lip erect, straight or falcate, 2-lobed, the lower spreading or drooping, its middle lobe sometimes notched or obcordate. In our species the upper lip of the calyx is longer than the lower, 3-2-toothed; the lower 2-parted; the teeth spinulose; corolla ringent.

1. **S. carduacea**, Benth. White-woolly with cobwebby hairs; stems nearly naked, surrounded at the base with thistle-like leaves; head-like false whorls 1 to 4, an inch or more in diameter, about equaling the involucre of spiny-toothed bracts; corolla 10 to 12 lines long, blue or purple.

2. **S. Columbariæ**, Benth. (Chia.) Soft pubescent; flower whorls 1 or 2; involucrate bracts, sometimes purplish; corolla 3 or 4 lines long, blue; leaves not spinescent.

9. AUDIBERTIA, Benth.

Sufficiently distinguished from *Salvia* in the synopsis.—Mostly hoary perennials, herbaceous or shrubby; with rugose-veiny, crenulate, sage-like leaves, and densely capitate-glomerate flowers.

1. **A. grandiflora**, Benth. Stems 1 to 3 feet high from a somewhat woody base; lower leaves 3 to 8 inches long; floral ones broadly ovate and membranaceous; corolla an inch and a half long; purple-crimson; stamens much exserted.

2. **A. humilis**, Benth. A span high, cespitose; leaves mainly radical; spike of 3 or 4 small, sessile, head-like clusters; corolla half an inch long or less, bluish purple.

3. **A. stachyoides**, Benth. Shrubby, 3 to 8 feet high; style and stamens little exserted; corolla about as the last.

10. SCUTELLARIA, L. SKULLCAP.

Calyx, with two entire lips and a gibbous projection on the back, closed after flowering. Corolla, with an elongated and curved ascending tube, a dilated throat, an erect arched or galeate upper lip, with which the lateral lobes appear to be connected; the anterior lobe appearing to form the whole lower lip.—Herbs, not aromatic; with single axillary, rather conspicuous flowers.

1. **S. angustifolia**, Pursh. A span to a foot high; leaves about an inch long; the radical ones often roundish or even cordate; corolla blue or violet, an inch long, with a slender tube; lower lobe villous inside.—Ours is mainly

Var. **canescens**, Gr. A form with soft, hoary pubescence, and the tube of the corolla bent so as to throw the upper part backward.

2. **S. Californica**, Gr. Puberulent; stems 8 to 20 inches high, slender; leaves from lanceolate-oblong to oval-ovate; the lower an inch or more long, often serrate; upper gradually reduced to half an inch or less; lips of the yellowish corolla about equal.

3. **S. tuberosa**, Benth. Soft, pubescent or villous; stems slender, erect and short, or trailing a foot in length; the filiform subterranean shoots bearing tubers; leaves mostly ovate, coarsely and obtusely few-toothed or entire, 5 to 18 lines long; corolla deep blue or violet.

11. BRUNELLA, Tourn. SELF-HEAL.

Calyx-lips closed in fruit. Corolla with ascending tube, open lips, and slightly-contracted orifice; upper lip arched and entire; lower 3-lobed, its middle lobe drooping, rounded, concave, denticulate.—Low perennials, the flowers crowded in a terminal oblong or cylindraceous head or spike.

1. **B. vulgaris**, L. A span to a foot or more in height; leaves ovate or oblong, slender-petioled; corolla violet, purple, or rarely white; calyx purplish.

12. STACHYS, L.

Corolla with cylindrical tube not dilated at the throat; the upper lip erect and concave or arched; the lower spreading, its middle lobe larger. Stamens ascending under the upper lip; filaments naked; anthers approximate in pairs, 2-celled.—Herbs, not aromatic, with flowers clustered, capitate, or scattered, often spicate at the end of the branches; flowers sessile or nearly so.

* *Corolla white or whitish; the upper lip bearded or woolly on the back; herbage tomentose or soft hairy.*

1. **S. ajugoides**, Benth. A span to a foot high; silky-villous with whitish hairs; leaves oblong, very obtuse, crenately serrate, 1 to 3 inches long, the upper sessile; flowers about 3 in the axils of the distant upper leaves, and loosely leafy-spicate at the summit.—Moist ground.

2. **S. albens**, Gr. Soft-tomentose with whitish wool, 3 to 5 ft. high; leaves mostly cordate at base, obtuse, crenate, 2 or 3 inches long; flowers several or many in capitate clusters which usually exceed the small floral leaves and form an interrupted spike; corolla white with purple dots on the lower lip.

3. **S. pycnantha**, Benth. Very hirsute, with long and mostly soft spreading hairs, not white, two feet high or more; flowers in a dense cylindraceous naked spike (an inch or two long), exceeding the small bract-like floral leaves except in the lowest and sometimes rather distant clusters; corolla white or cream-color, with purple on the lower lip. (?)

* * *Corolla purple, the upper lip hairy on the back; pubescence somewhat hispid; no tomentum.*

4. **S. bullata**, Benth. Stem retrorsely hispid, especially on the angles, 1 to 3 ft. high; leaves somewhat rugose, nearly all petioled, 1 to 2 inches long; flowers usually 6 in the false whorls, these rather distant, forming a narrow interrupted spike; lower lip of the corolla fully as long as the tube, 4 or 5 lines long, the upper half as long.—Variable.

* * * *Tube of the rose-red corolla twice as long as the calyx, 6 to 9 lines long.*

5. **S. Chamissonis**, Benth. Stem 2 to 5 ft. high, stout, mostly rough-hispid, with retrorse rigid bristles; leaves 2 to 5 inches long; lips of the corolla pubescent outside.—Wet ground.

13. TRICHOSTEMA, L. Blue-curls.

Calyx campanulate and almost equally 5-cleft. Corolla with short or slender tube and an almost equally 5-parted limb. Stamens with long capillary curved filaments, sometimes cohering at the base.—Strong scented herbs; with entire leaves, and blue or purple corolla and stamens. In ours the flowers are in cymose axillary clusters, somewhat raceme-like in age; the corolla about 5 lines long, and the stamens twice as long or more.

1. **T. laxum**, Gr. Minutely soft pubescent, about a foot high, simple or loosely branched from the base; leaves rather distant, lanceolate or oblong-lanceolate, tapering into a petiole at the base; flower clusters distinctly peduncled, usually forked and in age equaling the leaves; corolla almost smooth.

2. **T. lanceolatum**, Benth. Leafy; leaves much longer than the internodes, lanceolate or ovate-lanceolate, sessile by a broad base, 3–5-nerved, an inch or less long; flower clusters nearly sessile, short, one-sided; corolla somewhat pubescent.—Its odor sickening, tarry.

Order 46. VERBENACEÆ.

Herbs or shrubs differing from *Labiatæ* mainly in the ovary and fruit, which is undivided and 2–4-celled, at maturity either dry and splitting into as many 1-seeded nutlets, or drupaceous, containing as many little stones.

1. VERBENA, L.

Calyx 5-toothed, one tooth often shorter. Corolla salver-form, the limb unequally 5-cleft. Stamens included, the upper pair sometimes sterile. Stigma unequally lobed. Ovary 4-celled.—Herbs with small flowers, ours about 2 lines in diameter.

1. **V. officinalis,** L. Some of the lower leaves pinnatifid; spikes mostly solitary, filiform; corolla purple or lilac, 2 or more lines in diameter.

2. **V. hastata,** L. Stouter and taller, 3 to 6 ft. high; leaves serrate or incised, the lower hastate-3-lobed; spikes panicled, densely flowered; corolla blue, 2 lines in diameter.

3. **V. prostrata,** R. Br. Soft hirsute, diffuse, a foot high; villous spikes long; corolla violet or blue.

ORDER 47. PLANTAGINACEÆ.

Stemless herbs with flowers in spikes, the 4-cleft regular corolla dry and scarious.

1. PLANTAGO, L. PLANTAIN.

Flowers in spikes or heads, bracteate. Calyx of 4 persistent sepals free from the ovary. Stamens 2 or 4 on the corolla alternate with its lobes, anthers versatile. Style filiform, bearded above.—Stemless herbs with nerved or ribbed radical leaves and naked scapes of small greenish flowers.

* *Flowers with 4 stamens.*

1. **P. major,** L. Mostly smooth; leaves ovate or broadly oblong, abruptly contracted into a channeled petiole, 5–7-ribbed; spike long and slender; capsule 7–16-seeded.

2. **P. hirtella,** HBK. Leaves smooth, rather fleshy, oblanceolate to obovate, 3–7-ribbed, tapering into a narrow base or wing-margined petiole; scape 1 to 3 ft. high; flowers large.

3. **P. lanceolata,** L. Mostly hairy; leaves lanceolate, 3–5-ribbed; scape deeply grooved.

4. **P. maritima,** L. Leaves linear, fleshy; scapes usually short.

5. **P. Patagonica,** Jacq. Leaves linear to filiform, thin, usually silky-woolly.—Dry ground.

* * *Flowers with 2 stamens.*

6. **P. Bigelovii,** Gr. Leaves linear; small.—Salt marshes.

DIVISION 3. APETALÆ.

ORDER 48. ARISTOLOCHIACEÆ.

Twining shrubs or low herbs with perfect flowers, the conspicuous lurid calyx valvate in the bud and coherent with the 6-celled ovary, which forms a many-seeded 6-celled, pod or berry in fruit. Stamens 6–12, more or less united with the style; anthers adnate, extrorse. Leaves petioled, mostly heart-shaped and entire. *Gray's Manual.*

1. ARISTOLOCHIA, Tourn.

Calyx tubular, inflated above the ovary. Stamens 6, the sessile anthers adnate to the short stigma.

1. **A. Californica**, Gr. (Pipe-Vine.) A twining shrub with large cordate leaves, flowers curved like a Dutch pipe, greenish, marked with brown or purple.

2. ASARUM, Tourn.

Calyx regular, 3-cleft or parted. Stamens 12, with more or less distinct filaments; their tips usually continued beyond the anther into a point.—Stemless herbs with creeping rootstocks, bearing 2 or 3 scales, then one or two leaves, and terminated by a short peduncled-flower close to the ground.

1. **A. caudatum**, Lindl. (Wild Ginger.) The smooth broadly cordate leaves usually mottled with white; calyx bell-shaped, the acuminate lobes spreading, brownish purple. Common in forests; the flowers likely to be hidden under leaves.

ORDER 49. NYCTAGINACEÆ.

Herbs with mostly opposite and entire leaves, stems swollen at the joints, the tubular calyx corolla-like, its persistent base contracted, inclosing the 1-celled 1-seeded ovary, and becoming a sort of indehiscent pod.

1. ABRONIA, Juss.

Calyx salverform, with obcordate lobes. Stamens 5, included, adnate to the tube. Style included; stigma, capitate or clavate. Fruit 5-winged. Embryo by abortion monocotyledonous, enfolding mealy albumen. Low herbs, with the opposite thick petioled leaves unequal, and the flowers in involucrate heads. Common on sandy sea beaches. A viscid exudation causes sand to stick to every part of the plants.

1. **A. latifolia**, Esch. (Yellow Sand-Verbena.) Root perennial; stems procumbent; leaves very thick, sub-cordate to reniform, on thick petioles; flowers orange-yellow, fragrant.

2. **A. umbellata**, Lamb. (Pink Sand-Verbena.) Annual; stems decumbent, leaves oblong or ovate, attenuate at base into slender petioles; flowers pink.

3. **A. maritima**, Nutt. (Red Sand-Verbena.) Stouter than the last; leaves broader with shorter petioles; involucral bracts ovate; flowers bright red. From Santa Barbara southward.

4. **A. fragrans**, Nutt, of the Columbia River, has white flowers.

Five other species belonging to this western genus are found east of the Sierra Nevada.

ORDER 50. POLYGONACEÆ.

Herbs, with alternate entire leaves, and stipules in the form of sheaths, or obsolete, above the swollen joints of the stem; the flowers mostly perfect, with a more or less persistent calyx, a 1-celled ovary, bearing 2 or 4 styles or stigmas, and a single seed. Stamens 4–12 inserted on the base of the 3-6-cleft calyx.

1. POLYGONUM, L.

Calyx 5 parted; the divisions petal-like, persistent in fruit, and surrounding the usually 3-angled akene. Stamens 3 to 8. Styles or stigmas 2 or 3. Herbs with small flowers on jointed pedicels.

Knot-weed or Yard-grass and Smart-weed belong to this genus. About 20 species are found in California, of which 2 or 3 are probably introduced weeds.

2. RUMEX, L.

Calyx of 6 sepals; the three outer herbaceous, spreading in fruit; the three inner larger somewhat petaloid, covering the akene in fruit (then called valves), and often bearing grainlike appendages on the outside. Stamens 6. Styles 3; stigmas tufted. Introduced weeds with small greenish flowers crowded and whorled in panicled racemes.

The Docks and Sheep-sorrel are examples of this genus. Of the dozen species on this coast, half are introduced weeds.

3. ERIOGONUM, Michx.

Flowers borne in a many-to-few-flowered calyx-like involucre of united bracts; the pedicels exserted, jointed to the flower, with bractlets at the base. Calyx corolla-like; 6-parted or deeply 6-cleft. Stamens 9. Akene triangular.—Herbaceous or somewhat woody plants, usually with a woolly or scurfy pubescence; the entire leaves without stipules and mostly radical; juice frequently acid. Over 80 species grow west of the Mississippi, of which 50 are Californian, mostly Alpine.

Chorizanthe is a similar genus, in which the involucres are 1-flowered and rigid.

Orders *Amarantaceæ* and *Chenopodiaceæ* are represented by homely introduced and native weeds. Many of the latter order belong to the genus *Chenopodium*, viz.. *Goosefoot*, *Lamb's-quarters*, *Pigweed*, *Jerusalem*

Oak, Wormseed, etc. *Salicornia* (Glasswort) grows in salt marshes, and may be known by its fleshy leafless jointed stems, with opposite branches. The garden *Beet* belongs to this order.

ORDER 51. PIPERACEÆ.

Herbs with jointed stems, alternate entire leaves and perfect flowers in spikes, entirely destitute of floral envelopes.

1. ANEMOPSIS, Hook.

Flowers in a simple conical spadix, which is surrounded by a 5–8-leaved persistent colored involucre, each flower subtended by a free colored bract. Stamens 6 to 8, free, growing upon the immersed ovary.

1. **A. Californica**, Hook. Stem simple, erect, 3 to 15 inches high, with a single broad clasping leaf in the middle, and an axillary branchlet reduced to 1 or more petioled leaves; radical leaves oblong-oval, cordate at base, 2 to 6 inches long; involucre 1 to 1½ inches broad, white, becoming brown. Used medicinally by the Mexicans, who call it *Yerba Mansa.*

APETALOUS TREES.

The Order **Betulaceæ** (BIRCH FAMILY) is represented in California by two Birches, which scarcely attain to the dignity of trees, and are confined to the high Sierras, and four Alders, two of which grow in the central part of the State, viz.:

Alnus rubra, Bong. (Red Alder), and the more common

Alnus rhombifolia, Nutt (White Alder), which may be distinguished by its thinner leaves, not rusty beneath, and more slender branches not so distinctly dotted with white.

Myrica Californica, Cham. (Bayberry), representing the Order **Myricaceæ** grows in moist places, and may be known by its thick oblanceolate serrate evergreen leaves and dense clusters of small fruit, whitened by a coat of wax.

Umbellularia Californica, Nutt (Order **Lauraceæ**), is the well-known Laurel.

Platanus racemosa, Nutt, is the California Sycamore.

The Order **Salicaceæ** is represented by 4 or 5 Willows; large enough to be called trees, and 3 Poplars, viz.:

Populus tremuloides, Michx. (Quaking Asp), a small tree, with whitish bark and round ovate leaves. In the high Sierra. The only Californian tree, except one or two willows, found east of the Rocky Mountains.

P. trichacarpa, Torr. & Gr. (Cottonwood.) Petioles round; young bark brownish.

P. Fremonti, Wat. (Fremont's Cottonwood.) Petioles flattened; young bark yellowish.

The WALNUT FAMILY is represented by **Juglans Californica**, the California Black Walnut.

Ten kinds of Oak Trees, and several shrubs of the same genus, with the chestnut-like *Chinquapin*, represent the Order **Cupuliferæ.**

GLOSSARY.

Abortion, the imperfect formation or absence of a part.
Abrupt, ending suddenly.
Acaulescent, apparently stemless.
Accumbent, the radicle lying against the edges of the cotyledons.
Acerose, needle-shaped, like pine leaves.
Acuminate, ending in a tapering point.
Acute, merely sharp-pointed.
Adnate, growing fast to. When the anther seems to be attached by its whole length to the filament.
Aggregate, crowded into a cluster.
Akene, a 1-seeded seed-like fruit.
Albumen, nourishment in the seed not forming part of the embryo.
Androus, refers to stamens.
Anterior, on the side of the flower next the bract.
Apetalous, without petals.
Appressed, lying flat, or close together.
Ascending, rising obliquely.
Attenuate, tapering gradually.
Auriculate, ear-like lobes at the base.
Awn, an appendage like the beard of barley.
Axil, the angle between leaf and stem.

Bifid, 2-cleft to about the middle.
Bilabiate, 2-lipped.
Blade, the broad portion of a leaf
Bract, the leaf which subtends the flower.
Bractlet, a bract on a pedicel.

Caducous, falling off at the time of expansion.
Campanulate, bell-shaped.
Canescent, whitened with fine close pubescence.
Capillary, like a hair.
Capitate, having a head, or collected into a head.
Capsule, any compound dehiscent fruit.
Carpel, a simple pistil, or element of a compound one.
Caudate, tailed.
Caulescent, having an obvious stem.
Cauline, relating to a stem.
Ciliate, fringed with hairs.
Clavate, club-shaped.
Claw, the narrowed base of a petal.
Cleft, cut to about the middle.
Cohesion, the union of like organs.
Confluent, running together, or blending.
Conglomerate, thickly clustered.
Connate, united from the first.
Connective, the part of an anther connecting the cells.
Connivent, coming together or meeting.
Convolute, rolled up.
Cordate, heart-shaped with the point up.

Corymb, a flat-topped flower cluster, the pedicels unequal.

Costate, ribbed.

Cotyledons, the leaves of the embryo.

Creeping, running on the ground and rooting.

Crenate, the margin scolloped.

Cuneate, wedge-shaped.

Cuspidate, tipped with a rigid point.

Cyme, a flower cluster in which the oldest flowers are in the center.

Deciduous, falling off before withering; or, if leaves, before winter.

Declined, turned to one side.

Decumbent, reclining on the ground, the end rising.

Deflexed, bent downwards.

Dehiscent Fruits, etc., open by

Dehiscence, splitting as pods do.

Dentate, toothed, the teeth pointing directly away from the margin.

Depressed, flattened from above.

Diadelphous, stamens united by the filaments in two sets.

Dichotomous, forking into two branches.

Dicotyledenous, having two seed leaves.

Diffuse, widely and loosely spreading.

Digitate, compound with the parts arising at one point.

Diœcious, with stamens and pistils in separate blossoms on different individuals.

Dissected, cut into pieces, or nearly so.

Distinct, when parts of the same name do not cohere.

Divaricate, separating widely.

Divergent, the summits inclined from each other.

Drupe, a stone fruit (like a cherry).

Embryo, the rudimentary plant in a seed.

Entire, the margin whole and even, not lobed or toothed.

Epigynous, growing on the ovary.

Erose, irregularly notched as if gnawed.

Exserted, protruding beyond other organs.

Exstipulate, without stipules.

Extrorse, turned outward.

Fascicle, a close cyme, a bundle of leaves.

Fertile Flower, one having pistils.

Filament, the stalk of an anther.

Filiform, like a thread.

Foliaceous, like a leaf.

Foliolate, consisting of leaflets (5-foliolate means with five leaflets).

Follicle, a simple pod opening down one side.

Fruit, the seed and all that belong to it.

Glaucous, covered with a whitish bloom which rubs off, as the surface of a cabbage leaf, or a plum.

Glomerate, clustered into a ball.

Glomerule, a capitate cyme.

Hastate, with a spreading lobe at the base on each side.

Hirsute, clothed with coarse hairs.

Hispid, beset with bristly hairs.

Hoary, grayish white from a white pubescence.

Hypogynous, growing under the pistil, free from the calyx and corolla.

Incumbent, when the radicle lies against the back of one of the cotyledons.

Inferior, underneath or anterior.

Innate, borne on the apex or end.

Introrse, turned inward.

Involucre, a set of bracts surrounding a flower cluster.
Involute, rolled inward.
Irregular, unequal in size or shape.

Laciniate, cut into narrow incisions.
Lamina, blade of a leaf or petal.
Lateral, pertaining to the side.
Legume, fruit like a pea-pod.
Limb, the exposed part of a corolla, calyx, etc., or the blade of a petal, etc.
Line, the twelfth of an inch.
Linear, narrow and much longer than wide, the margins parallel.
Lobe, any division or projecting part.

Merous, the parts of a flower (5-merous, the parts in fives).
Mucronate, abruptly tipped with a short point.

Nerves, parallel and simple veins.
Nodding, the apex or top pointing downward.

Ob-, prefixed means reverse of; as, ob-cordate, inverted heart-shaped, *i. e.*, the stem attached to the apex.
Oblique, one-sided.
Oblong, long-elliptical.
Ochroleucous, pale dull yellow.
Oval, broadly elliptical.
Ovary, that portion of the pistil which becomes the seed vessel.
Ovate, like the longitudinal section of an egg.
Ovoid, egg-shaped.

Palmate, lobed so that the lobes point away from the end of the petiole, as in an ivy or a maple leaf.
Panicle, a raceme branching irregularly.
Parted, cut almost through.
Pectinate, like the teeth of a comb.
Pedicel, the stalk of a single blossom in a cluster.
Peduncle, the stalk of a cluster or of a solitary flower.
Perfoliate, when the stem seems to pass through the leaf.
Perforate, with holes or transparent dots.
Perigynous, borne on the calyx.
Persistent, remaining until the fruit has grown.
Petiole, the leaf stem.
Petiolule, the stem of a leaflet.
Pilose, with distinct straight hairs.
Pinnate, a compound leaf with the leaflets along the side of a common petiole.
Pinnately cleft, lobed, etc., with the lobes along the sides of a long leaf.
Placenta, the part of the ovary which bears the seeds.
Pod, a dry dehiscent fruit.
Pome, a fruit like a pear or apple.
Posterior, next the stem.
Procumbent, lying along the ground.
Prostrate, lying flat like a melon-vine.
Pubescent, with soft or downy hairs.
Punctate, dotted as if by holes.
Pungent, rigid sharp-pointed.

Raceme, elongated flower bunches, with the oldest flowers below and on pedicels.
Radical, coming from the root (apparently).
Radicle, the stem of an embryo.
Reniform, kidney-shaped.
Repand, the margin slightly wavy.
Retrorse, directed backward.
Retuse, slightly notched at a rounded apex.

Revolute, rolled backward.
Rachis, the main stem in a spike, etc.
Rootstock, an underground stem.
Rotate, wheel-shaped.
Runcinate, teeth pointing backward.

Sagittate, like an arrow-head.
Salver-shaped, tubular, the border spreading at right angles to the tube.
Scape, a flower-stalk rising from the ground or near it.
Scorpioid, coiled round like a scorpion.
Secund, all turned to one side.
Serrate, with teeth like a saw.
Setaceous, like a bristle.
Spatulate, like a druggist's spatula.
Spike, a long inflorescence of sessile flowers.
Stellate, star-shaped.
Stigma, the part of a pistil which receives the pollen.
Stipe, the stalk of an ovary.
Stipel, the stipule of a leaflet.
Stipellate, having stipels.
Stipitate, having a stipe.
Stipule, appendage on each side at the base of a leaf.
Strict, very straight or close or upright.
Strigose, clothed with close-pressed stout sharp hairs or scale-like bristles.
Style, the slender part of a pistil.
Subulate, tapering to a sharp rigid point.
Suffrutescent, or *suffruticose*, shrubby at the base.

Terete, cylindrical, long and round.
Terminal, at the end or summit.
Thyrse, a thick panicle (Lilac blossoms).
Tomentose, clothed with a close and matted down.
Torulose, swollen at intervals.
Truncate, as if cut off at the end.

Umbel, umbrella-like inflorescence.

Verticillate, whorled, forming a ring around the stem.
Villous, with long soft hairs.
Viscid, sticky.

ADDITIONAL WORDS.

Adventitious, out of the usual place; as roots on stems.
Caudex, an upright rootstock.
Cusp, a spear-like point.
Deltoid, triangular.
Flaccid, soft, weak, drooping.
Fusiform, spindle-shaped.
Glabrous, smooth.
Involucrate, provided with an involucre.
Loculicidal, splitting down the middle of the back of a cell.
Lunate, crescent-shaped.
Mucronulate, tipped with a minute point.
Papilionaceous, like the corolla of a pea.
Perianth, calyx and corolla together.
Reticulated, netted-veined.
Rugose, wrinkled, rough with wrinkles.
Saccate, with sacks or pouches.
Scabrous, rough or harsh.
Scarious, thin, dry, membranous.
Septicidal, splitting between the cells.
Spadix, a fleshy spike of flowers.
Spathe, a bract which inwraps flowers.
Succulent, fleshy, juicy.
Staminodia, Sterile stamens or bodies like stamens.
Turbinate, top-shaped, an inverted cone.

GLOSSARY

OF

GENERIC AND SPECIFIC NAMES.

All the generic and specific names found in this work are here defined except a few of obscure or unknown meaning and some which have undoubtedly been overlooked. Commemorative names are followed by the names—when known to me—of those thus honored. Specific names are given sometimes in one gender, sometimes in another. The learner must know that, as a rule, if a specific name ends in *us*, *a*, or *um*, it may end in either of the other two to correspond with the gender of the generic name; as, *Convolvulus Californicus* (Masculine), *Polygala Californica* (Feminine), *Galium Californicum* (Neuter). Or, the specific name may end in *is* or *e*, the former agreeing with masculine and feminine generic names, the latter with neuter names. The meaning of each name, where possible, is given in a form suitable for a common or English name of the plant.

Achilleæfolia, Yarrow-leaved.

Aconitum, the ancient name.

Adenostoma, glandular stoma (breathing pores).

Affinis, near, or related to.

Ajugoides, Ajuga-like; *i. e.*, like Bugle, a labiate plant.

Albens, white.

Albescens, becoming white.

Albicaulis, white-stemmed.

Alchemilla, the Arabic name.

Alismæfolius, Alisma-leaved, *i. e.*, leaves like those of Water Plantain.

Allium, the Latin name of Garlic.

Alnifolia, Alder-leaved.

Amelanchier, the French name.

Americana, American.

Amœna, charming.

Amorpha, without form (flower wanting four petals).

Amplectans, twining or embracing.

Amplexicaulis, stem-encircled, *i. e.*, by embracing leaves.

Amsinckia, William Amsinck, of Hamburg.

Anagallis, from a Greek word meaning to laugh.

Anagalloides, Anagallis-like; like Pimpernel.

Andersoni, Dr. C. L. Anderson, a California botanist.

Andrewsiana, Dr. Andrews, a pioneer botanist.

Andrewsii, Dr. Andrews, a pioneer botanist.

Andromedia, in honor of the goddess of that name.

Anemone, from Greek for wind.

Angustifolia, narrow-leaved.

Anserina, from the Latin for goose.

Aparine, the Greek name.
Apocynum, dog-bane; dog-poison.
Aquatalis, aquatic; water.
Aquifolium, Holly-leaved.
Aquilegia, from Latin for eagle (the petals like eagles' claws).
Arabis, from Arabia.
Arenaria, sand, belonging in sand.
Arboreus, tree-like.
Arbutifolia, Arbutus-leaved.
Arbutus, the ancient name.
Arctostaphylos, Bearberry.
Ariæfolia, Aria-leaved.
Armeria, the Monkish Latin for the Pink.
Aromatica, aromatic.
Arvensis, field (growing in cultivated fields).
Asclepias, Esculapius, God of Medicine.
Asper, rough.
Asperum, rough.
Assurgentiflora, flowers bending upward.
Attenuatus, slender.
Attenuifolium, slender-leaved.
Audibertia, M. Audibert, a Frenchman.
Aurea, golden.
Aurita, little-eared (referring to the leaves).
Azureus, blue.

Barbigerum, bearded.
Bartsiæfolia, Bartsia-leaved.
Berberis, the Arabic name for the Barberry.
Bicolor, two-colored.
Biennis, biennial (*i. e.*, flowering the second year and then dying).
Bifidum, bifid, divided.
Biflora, two-flowered.
Bifolium, two-leaved.
Bigelovii, Dr. J. M. Bigelow, a pioneer botanist.
Biloba, two-lobed.
Bisceptrum, two-stemmed, *i. e.*, two scapes.
Bistorta, twice-twisted.
Blepharophylla, eyelash-leaved.
Bloomeria, H. G. Bloomer, a pioneer botanist.
Bolanderi, H. N. Bolander, a well-known botanist of this coast.
Borealis, northern.
Boschniakia, Boschniaki, a Russian.
Boykinia, Dr. Boykin, of Georgia.
Brachycarpa, short-pod.
Bracteata, bracted.
Bracteosa, bracted.
Brassica, old name for cabbage.
Breviflora, short-flowered.
Brevifolium, short-leaved.
Breweri, Wm. H. Brewer, Botanist of the California Geological Survey.
Brunella, from German name of a throat disease which this plant was supposed to cure.
Bullata, jeweled; blistered.
Bursa-pastoris, shepherd's purse.

Cæruleus, deep blue.
Cæspitosa, tufted.
Californica, California.
Calochortus, beautiful grass.
Calycanthus, cup-flower.
Calycina, cup-like.
Campanula, bell.
Campestris, field (uncultivated).
Canadensis, Canadian.
Canescens, white-haired; hoary.
Canina, dog.
Cannabinum, hemp-like.
Capitata, capitate (bearing a head of flowers).

CAPSELLA, little-pod.
CARDAMINE, heart-cure.
CARDINALIS, cardinal; chief.
CARDUACEA, thistle-like.
CAROLINENSE, Carolina.
CAROLINIANUM, Carolina.
CASTILLEIA, Castillejo, a Spanish botanist.
CASTILLEIOIDES, Castilleia-like.
CEANOTHUS, old name.
CENTRANTHIFOLIUS, Centranthus-leaved.
CERASIFORMIS, cherry-like.
CERASTIUM, from Greek for a horn (referring to the horn-shaped pods).
CERCOCARPUS, tailed-fruit.
CHAMMISSONIS, A. von Chamisso, a poet and botanist who visited this coast with Eschscholtz early in this century.
CHEIRANTHIFOLIA, wallflower-leaved.
CHEIRANTHUS, Arabic name.
CHILENSIS, Chili.
CHIMAPHILA, winter-lover.
CHLOROGALUM, greenish milk.
CHRYSANTHEMIFOLIA, Crysanthemum-leaved.
CHRYSANTHA, golden-flowered.
CILIATA, hair-fringed.
CIRCÆA, Circe, the enchantress.
CIRCINATA, coiled; crosier-like.
CLARKIA, General Wm. Clarke, who crossed the continent in 1803–1806.
CLAYTONIA, Dr. John Clayton, an early botanist of Virginia.
CLEMATIS, ancient name of a climbing plant.
CLINTONIA, Governor De Witt Clinton, of New York.
COLLINSIA, Zaccheus Collins, of Philadelphia.
COLLINSIOIDES, Collinsia-like.
COLLOMIA, from Greek for glue, on account of the mucilaginous seeds.
COMOSUM, hair-tufted.
CONCINNUM, beautiful.
CONGESTA, bunched.
CORDIFOLIUS, heart-leaved.
CORDYLANTHUS, club-flower.
CORYMBOSUS, corymbose (flowers in a corymb).
COTULÆFOLIA, Cotula-leaved.
CRASSIFOLIA, thick-leaved.
CRENATUS, crenate.
CRESSA, Cretan woman.
CRETICA, Cretan.
CROCEA, yellow; saffron-colored.
CROTELLARIÆ, rattle-pod.
CUNEATUS, wedge-shaped.
CURVIPES, curved-pedicel.
CYNOGLOSSUM, hound's-tongue.
CYPRIPEDIUM, Venus's slipper.
CYTISOIDES, like snail-clover.

DATURA, an altered Arabic name.
DECORUM, comely; pretty.
DELPHINIUM, dolphin.
DEMISSA, lowly; humble.
DENDROMECON, tree-poppy.
DENSIFLORUS, dense-flowering.
DENSIFOLIA, densely-leaved.
DENTATA, dentate; notched.
DENTICULATA, denticulate; finely toothed.
DICENTRA, twice-spurred; two spurs.
DICHOTOMUS, two-forked.
DISCOLOR, variable (as to color or form).
DIVARICATA, spreading.
DODECATHEON, twelve gods.
DOUGLASII, David Douglas, a Scottish explorer of the Botany of this coast.
DUMOSA, bushy.

ECHINOSPERMUM, hedgehog-seed.
ELEGANS, elegant; beautiful.
ELLISIA, John Ellis, an English botanist.
EMARGINATA, emarginate; notched.

Emmenanthe, persistent-flower.

Epilobium, a violet on a pod.

Erianthus, woolly-flowered.

Eriodyctyon, a network of wool (on the leaves).

Eritrichium, woolly-hair.

Erodium, from Greek for heron (the fruit like the bill of a heron).

Erysimum, from a word meaning to blister.

Erythræa, from a word meaning red.

Eschscholtzia, J. F. Eschscholtz, a German botanist, who visited California early in this century.

Eubrodiæa, true Brodiæa.

Falcifolium, falchion-leaved.

Farinosa, starchy.

Fasciculata, fascicled (referring to the leaves).

Faucibarbatus, beard-throat.

Filifolia, thread-leaved.

Flammula, a little banner or flame.

Floribunda, many-flowered.

Foliolosa, leafy.

Formosa, beautifully formed.

Fragaria, fragrance.

Fraxinus, from a Latin word meaning easily split.

Fritillaria, from Latin for checker-board, the petals of the first-named species being checkered.

Fucata, colored,

Fulvum, tawny; yellow.

Gallica, Gallic (French).

Gaultheria, Dr. Gaulthier, of Quebec.

Gentiana, Gentius, king of Illyria.

Gigantea, gigantic; huge.

Gilea, Philip Gil.

Githopsis, resembling Gith (Corn-cockle).

Glabrus, smooth.

Glabratus, smooth.

Glandulosus, glandular.

Glaucus, bluish-gray, or with a bloom.

Glaux, from Greek for sea-green.

Glutinosus, glutinous; sticky.

Glycyrrhiza, sweet-root.

Godetia, Dr. Godet.

Gomphocarpus, nail-pod.

Gracile, slender.

Gracilentus, slender.

Graciliflorus, slender-flowered.

Grandiflora, grand-flowered.

Greenei, Rev. E. L. Greene, who has diligently explored the Botany of this State.

Gymnocarpus, naked-fruited; naked-pod.

Hastatus, spear-bearing.

Hebecarpus, blunt-pod (?)

Hederaceus, Ivy-like.

Heliotropium, from Greek for sun and turn.

Heterophyllus, variously leaved.

Heuchera, J. H. Heucher, a German botanist.

Hexandra, six-stamened.

Hirsutissimus, bristly, or very hairy.

Hispidula, bristly; prickly.

Humilis, low; small.

Hypericum, the Greek name.

Ilicifolius, Holly-leaved.

Incanus, gray; hoary.

Icisum, incised; cut.

Inconspicuus, inconspicuous.

Insignis, remarkable; marked.

Integerrimus, most vigorous.

Integrifolia, entire-leaved.

Intermedius, intermediate.

Intertextus, intertwined.

Involucratus, involucrate.

Iris, rainbow.
Ixioides, Ixia-like.

Juncea, rush-like.
Jussiæa, Bernard de Jussieu, founder of the Natural System.

Labiatæ, from labia, a lip.
Lacinatus, laciniate.
Lactea, milk-white.
Lævicaulis, smooth-stemmed.
Lacunosum, pitted.
Lanceolatus, lanceolate.
Latifolius, broad-leaved.
Lathyrus, the Greek name of a similar plant.
Latipes, broad-pediceled.
Laxus, loose.
Lepigonum, scaly-joint.
Lepidium, scale-pod.
Leptophyllus, slender-leaved.
Lepidotus, scaly (?)
Lepidus, charming.
Leptosiphon, slender-tubed.
Lemmoni, J. G. Lemmon, a very successful California botanist.
Leucodermis, white-skinned.
Leucocephalus, white-headed.
Leucocrinum, white-lily.
Leucophyllus, white-leaved.
Lewisia, Capt. M. Lewis, who crossed the continent with Clarke in 1803–1806.
Ligusticifolius, Lovage-leaved.
Liliaceus, lily-like.
Limnanthes, pond-flower.
Limonium, mud-plant (an old generic name.)
Limosella, from limus, mud.
Linaria, from Linum, the botanical name of Flax.
Linearifolium, narrow-leaved.
Liniflora, flax-flowered; the Latin name Linum.
Lithospermoides, like Lithospermum.
Littoralis, sea-beach.
Lobatus, lobed.
Longiflorus, long-flowered.
Longiloba, long lobed.
Longipes, long-pediceled.
Luteolus, yellowish.
Luteus, yellow.
Lupinus, wolf.
Lupulinus, hop-like.
Lucidus, bright, transparent.
Lycopus, wolf-foot.
Lycopsoides, Lycopus-like.
Lythrum, from Greek for blood.

Macranthus, large-flowered.
Macrocera, large-horned.
Macrocarpa, large-fruited.
Macrostachya, large-spiked.
Macrothecum, large-anthered.
Maculatus, spotted.
Maianthemum, mountain nymph.
Major, greater; larger.
Malva, from a word meaning soft.
Malvæflorus, Mallows-flowered.
Malvæfolius, Mallows-leaved.
Mariposa, butterfly.
Maritimum, coast.
Meadia, Dr. Mead, of Illinois.
Meconopsis, Poppy-like.
Medicago, from Media, its native country.
Medius, middle.
Megarrhiza, big-root.
Melilotus, honey-flower.
Mentha, from the name of a Nymph fabled to have been changed to mint.
Menyanthes, month-flower.
Menziesii, Dr. Archibald Menzies, a companion of Vancouver.

Mentzelia, Dr. C. Mentzel.
Mertensia, Prof. F. C. Mertens, of Bremen.
Mesembryanthemum, midday-flower.
Micranthus, small-flowered.
Microcephalum, small-headed.
Microcarpus, small-fruited.
Micromeria, small-part.
Mimulus, ape; mimic.
Mineatus, vermilion-colored.
Minimus, smallest.
Minor, smaller.
Modestus, modest.
Mollugo, the Latin name.
Montanus, mountain.
Monardella, little Monarda, a genus named for Nicholas Monardes, a writer on medicinal plants.
Moschatus, musky.
Muhlenbergii, Dr. H. Muhlenberg, an American botanist.
Muilla, Allium reversed.
Multicaulis, many-stemmed.
Muricatus, rough, with hard points.
Myrtifolius, myrtle-leaved.

Nanus, dwarf.
Nemerosa, wood; forest.
Nemophila, grove-lover.
Nicotiana, John Nicot, who introduced tobacco into Europe.
Niteus, beautiful; bright.
Nitidum, shining.
Nudicaule, naked-stemmed.
Nudus, naked.
Nuttallia, Thomas Nuttall, botanist and ornithologist.

Obtusifolia, blunt-leaved.
Ocellata, spotted with little eyes.
Occidentalis, western.
Œnothera, wine-sucker (roots cause thirst).
Officinalis, medicinal.
Orbicularis, round.
Oregana, Oregon.
Orthocarpus, erect-fruit.
Ovata, egg-shaped (leaves).
Oxycarpum, sharp-fruited.
Oxycaryum, sharp-nut.

Pæonia, the ancient name.
Pacifica, Pacific.
Palustris, swamp; marsh.
Papillosus, warty.
Parviflorus, small-flowered.
Parvifolius, small-leaved.
Patagonica, Patagonian.
Paucisecta, few-lobed.
Pectocarya, comb-toothed nut.
Pedatus, foot-shaped.
Pedicularis, from pediculus, a louse.
Peltatum, shield; shield-shaped.
Penduliflora, hanging flower; drooping-flower.
Penicillata, brush-like. (Stigma with a tuft of hairs).
Pentstemon, five stamens.
Perfoliata, perfoliate (the stem growing through the leaf).
Pharnaceoides, Ginseng-like.
Philadelphus, Philadelphus, a King of Egypt.
Picta, painted; colored.
Pilosissima, most-hairy.
Pinnata, pinnate; feather-like.
Pirus, old Latin name of the pear tree.
Platystemon, flat-stamen.
Platystigma, flat-stigma.
Pluriflora, many-flowered.
Pogogyne, bearded-pistil.

Polygala, much milk (said to increase secretion of milk).
Polysepalum, many-sepaled
Pomeridianum, after-noon.
Prenanthoides, Prenanthus-like.
Prosartes, from Greek to hang.
Prostata, prostrate.
Psoralia, scurf.
Pterospora, wing-seed.
Ptelea, Greek for elm.
Pulchella, beautiful.
Pumila, dwarf; little.
Pungens, pungent; biting.
Purpurascens, growing purple; purplish.
Pycnanthemum, dense-flowers.
Pycnantha, dense-flowering.

Quercifolia, oak-leaved
Quadrangularis, four-sided.

Racemosa, racemose; raceme-bearing.
Radicans, rooting.
Ramosissima, branching; full of branches.
Ranunculus, from Latin for frog (some of the species aquatic).
Raphanus, quick-grower.
Rariflorum, seldom-flowering.
Recurva, recurved.
Rediviva, reviving.
Rhomboidea, rhomboidal.
Rhus, red (the prevailing color of the plentiful fruit in the genus).
Ribes, the Arabic name.
Rigidus, stiff; rigid.
Rivularis, river.
Romanzoffia, Nicholas Romanzoff, a Russian nobleman, who early in this century sent Kotzebue (accompanied by Chamisso and Eschscholtz) to this coast.
Rosa, the ancient name.
Roseus, rosy.
Rotundifolia, round-leaved.
Rubescens, reddening; reddish.
Rubus, red (the color of the fruit).
Rustica, country; rustic.

Salvia, from a Latin word meaning to save.
Sambucus, from the name of an ancient musical instrument, said to have been made of Elder.
Sanguinea, bloody.
Sarcodes, from the Greek for flesh.
Sarmentosa, running (as strawberries).
Sativa, cultivated; tame.
Saxifraga, rock-breaker.
Scoliopus, worm-peduncle.
Scrophularia, scrofula cure.
Scutellaria, from scutella, a dish (because of the calyx).
Serpylloides, Thyme-like.
Serratum, serrate; toothed
Sessile, sessile; stemless.
Sessilifolia, sessile-leaved.
Shallon, the Indian name.
Sidalcia.
Silene, from a Greek word meaning saliva.
Simplex, simple.
Sitchensis, Sitka.
Soldanella, the generic name of another plant.
Sorediatus, covered with granules.
Sparsiflorus, sparse-flowered.
Spathulata, spatulate.
Speciosus, showy.
Spectabilis, notable; admirable.
Specularia, from *speculum*, a looking-glass.
Spiræa, old name of Meadow Sweet.
Stachys, the ancient name.
Stachyoides, Stachys-like.

STATICE, the ancient name.
STELLARIA, from *stella*, a star.
STELLATA, starry; star-like.
STIPULARIS, stipulate.
STIVERI, C. H. Stivers
STRICTUM, upright.
STRIGULOSUS, bristly.
STROBILACEA, cone-like (a pine cone).
STROBILINA, little cone.
STROPHOLIRION, twisted-lily.
SUBPINNATA, nearly-pinnate.
SYMPHORICARPUS, cluster-fruit.
SYMPLOCARPUS, united-fruit.

TANACETIFOLIUS, Tansy-leaved.
TATULA, an old generic name (?).
TELLIMA, anagram of Mitella.
TENAX, tough.
TENELLA, tender; delicate.
TENER, soft. tender.
TENUILOBA, slender-lobed.
TENUIFOLIUS, thin-leaved.
TESSELLATA, checkered (seeds).
THYSANOCARPUS, fringe-pod.
THYRSIFLORUS, thyrse-flowered.
TIARELLA, a little mitre (the pod).
TINCTORIA, useful as a dye.
TOMENTOSUS, woolly; tomentose.
TRACHYANDRA, rough anther.
TRIDENTATUS, three-toothed; three-pronged.
TRICHANTHA, hair-flowered.
TRICHOPHYLLUS, hair-leaved.
TRICOLOR, three-colored.
TRIFIDUM, three-parted.
TRIFLORUS, three-flowered.
TRIFOLIATA, three-leaved.
TRIFOLIUM, three-leaves.
TRILLIUM, triple (leaves, petals, etc., in threes).
TRUNCATA, truncate.
TUBEROSA, tuber-bearing.

UMBELLATA, umbellate.
UMBELLIFERUM, umbel-bearing.
UNDULATA, wavy.
UNIFLORUS, one-flowering.
UNIFOLIATA, one-leaved.
URSINUS, bear.

VACCINNIUM, the ancient name.
VAGANS, wandering; spreading.
VANCOUVERIA, Capt. George Vancouver, who explored this coast in 1792–1794.
VENENOSUS, deadly-poisonous.
VENOSUS, veiny.
VENUSTUS, beautiful.
VESTITA, clothed; covered.
VERNICOSA, varnished.
VERONICA, for St. Veronica (?).
VERTICILLATA, whorled.
VILLOSUS, hairy.
VISCIDULA, sticky.
VIRGINIENSIS, Virginian.
VITIS, the ancient name.
VULGARIS, common.

WHIPPLEA, Gen. A. W. Whipple, who visited this coast in 1849, in command of a Government Survey Party.

XEROPHYLLUM, dry-leaf.

YUCCA, the Indian name.

ZAUSCHNERIA, M. Zauschner, a Bohemian botanist.
ZYGADENUS, yoked-glands.

ANALYTICAL KEY

TO

WEST COAST BOTANY,

CONTAINING DESCRIPTIONS

OF

Sixteen Hundred Species of Flowering Plants,

GROWING WEST OF THE SIERRA NEVADA AND CASCADE CRESTS,
FROM SAN DIEGO TO PUGET SOUND.

By VOLNEY RATTAN,
Teacher of Natural Sciences in the Girls' High School,
San Francisco.

SAN FRANCISCO:
THE BANCROFT COMPANY.
1888.

PREFACE.

THIS Key is preliminary to a West Coast Botany for beginners, which will probably be completed within three years. The object in publishing this skeleton in advance is twofold: it will be serviceable in connection with the Popular California Flora, while its use will disclose mistakes and weak places which can be corrected and strengthened for the betterment of the final work.

The material has mostly been drawn from Gray's Synoptical Flora of North America and the California Botany. Free use has also been made of Gray's and Watson's Contributions to American Botany; Greene's monographs in the Bulletin of the California Academy of Sciences, and the contributions of these and other authors in Coulter's Botanical Gazette and the Bulletin of the Torrey Club.

The intention has been to describe all polypetalous and gamopetalous plants growing in the region indicated on the title page, except those belonging to the orders Umbelliferæ and Compositæ; also all the species in the endogenous orders Alismaceæ, Orchidaceæ, Iridaceæ and Liliaceæ. The scope of the West Coast Botany will be a little broader, including some of the Apetalæ and possibly a tribe of the Compositæ. The introductory lessons and glossaries will be more ample than those of the California Flora.

I shall be very thankful for notes of omissions, corrections, criticisms and suggestions.

VOLNEY RATTAN.

SAN FRANCISCO, Jan. 22, 1887.

DIRECTIONS FOR THE BEGINNER.

After you have carefully examined the plant and at least mentally described every part of it, read the first line of the key on the opposite page. If the sepals and petals together number 8 or 10—as is usually the case—then the plant belongs to **CLASS I.**, which refers us to the prominent heading below, under which we read, "Calyx and corolla both present." If so, read the next line, which, we will suppose, does not fit our plant; then the petals must be united, and we turn to DIVISION 2, page 9, where we are called upon to say whether the ovary is inferior or not. Suppose it is superior. Turn, then, to "**B. Ovary superior.**" But our flower is one-sided, so, instead of searching under "**1. Flowers regular or nearly so,**" we look ahead till our eyes catch on page 10, the similar line, "**2. Flowers irregular: style 1; stigma entire or 2-lobed.**" Strangely enough there *is* but *one* style, and there *are two* flat stigmas. The leaves being opposite we pass the first line and try the next, having the same marginal distance, reading, "Leaves opposite or whorled: stamens 2 or 4." Reading the three lines under this head, beginning with the word "Ovary," we easily determine from the negative evidence (the ovary not in 4 pieces; the flowers not small, or in spikes) that the plant belongs to the order **Scrophulariaceæ**, page 93. We are there confronted by another key. The leaves of our plant not being alternate, we must look under "B." Reading the lines marked with asterisks we take the first, for our plant has 4 stamens. We then read *all* the lines under this head and decide that our genus must be No. 10; viz., "**10. MIMULUS**, Linnæus," which we find on page 98. Our plant, then, is one of the 40 species of *Mimulus* there named. Fortunate indeed are we if it happens to be one of the distinctly marked species like *Mimulus glutinosus*, the Shrubby Mimulus; or *Mimulus cardinalis*, the Cardinal or Scarlet Mimulus. In any event we work with this key as with the others. The chief heads are indicated by stars. Suppose the corolla is yellow but the plant not viscid; then it must be sought under the 5-starred head. Here we must read *all* the lines beginning with "Leaves." Having reached a conclusion, we look up the species under the number given at the end of the line; say, No. 23, where we find a few more words descriptive of *Mimulus luteus*. We next look in the index for "Mimulus" and there find a reference to p. 92 of the Popular Flora, where there is a more ample description of the species. Finally we turn to the Glossary of Generic and Specific Names, where we learn that mimulus means, ape, or mimic; and luteus means, yellow. Perhaps Linnæus, who delighted in fanciful names, saw in the gaping corolla a monkey-like grin. Since there are many yellow species now known, the name is not significant; but we may call it the Common Yellow Mimulus, or Monkey Flower.

KEY TO THE ORDERS.

*** **Figures in the margin refer to pages. When names are not followed by figures the genus or order indicated is not elsewhere described in this book.**

Calyx and corolla together of either more or less than six parts..........CLASS I, 5
Calyx and corolla together of just six parts: petals never five.
  Stamens six or three.......................................} CLASS II, 12
  Stamens many: sepals three, green.........................}
  Stamens one or two united to the style: ovary inferior........}
  Stamens many: flowers solitary on long peduncles...........Papaveraceæ, 18
  Stamens ten: petal one: a shrub............................Leguminosæ, 39
  Stamens nine: flowers apetalous, small.
    An aromatic tree: flowers greenish...............*Umbellularia.* (*Laurel.*)
    Herbs with several or many flowers in involucral cups.........*Eriogonum.*

CLASS I.—EXOGENS OR DICOTYLEDONS.

Calyx and corolla both present.
  Petals not united (distinct)................................DIVISION 1, 5
  Petals more or less united (cohering)........................DIVISION 2, 9
Calyx and corolla one or both wanting............................DIVISION 3, 10

DIVISION 1.—POLYPETALÆ.

A. STAMENS MORE THAN 10.

1. Stamens not adhering to the sepals or petals (on the receptacle).

* *Pistils few to many distinct carpels.*

Calyx deciduous, sepals 5: no stipules............................Ranunculaceæ, 14
Calyx persistent, sepals 3 or 4: growing in water..................Nymphæaceæ, 17
Calyx persistent, sepals 5 or 10: leaves with stipules.....................Rosaceæ, 48
Calyx of petal-like sepals: corolla often wanting.................Ranunculaceæ, 14

* * *Pistil compound, of 2 or more united carpels; as shown by more than one stigma-lobe, stigma, style or cell in the ovary; or by its not being at all one sided.*

Petals more numerous than the sepals:
Indefinitely numerous, slender, persistent. Aquatic plants..**Nymphæaceæ,** 17
Just twice as many (4 or 6): sepals caducous................**Papaveraceæ,** 18
Five to sixteen; style 3-8-cleft: fleshy herbs.................**Portulacaceæ,** 31
Petals of the same number (5) as the persistent sepals.
Leaves opposite: sepals equal.................................**Hypericaceæ,** 33
Leaves alternate: sepals unequal.................................**Cistaceæ,** 26
Leaves radical, hollow, 2-appendaged at hooded top........**Sarraceniaceæ,** 18

2. Stamens and petals on the free or adnate calyx.

Leafless, thorny, fleshy plants: ovary prickly, inferior..................**Cactaceæ,** 64
Leaves mostly opposite, very fleshy: ovary inferior......................**Ficoideæ,** 65
Leaves opposite. Shrub: sepals and petals numerous............**Calycanthaceæ,** 53
Shrubs: sepals 4 to 7: flowers white.............**Saxifragaceæ,** 54
Leaves alternate or radical: herbs or shrubs..............................**Rosaceæ,** 48
Leaves alternate; no stipules: rough herbs: ovary inferior...............**Loasaceæ,** 63

3. Stamens on the claws of the petals.

Stamens many, distinct, anthers long: calyx a conical cap: petals 4..**Papaveraceæ,** 18
Stamens many, united into a tube: anthers small: petals 5. ....**Malvaceæ,** 33
Stamens 10 to 16, united half way: shrub..........................**Styracaceæ,** 77

B. STAMENS 10 OR LESS.

1. Ovary or ovaries superior (i.e., free from the calyx) or mainly so, but sometimes included in the calyx-tube.

* *Pistils more than one, not united.*

Pistils of the same number as petals and sepals.
Leaves simple, entire, fleshy...................................**Crassulaceæ,** 57
Leaves pinnate: styles united, globular ovaries distinct..........**Geraniaceæ,** 36
Pistils not of the same number as the sepals and petals.
Two or three. Shrubs or trees: leaves opposite, compound......**Sapindaceæ,** 38
Herbs; leaves simple.......................**Saxifragaceæ,** 54
Many. Stamens on the receptacle.........................**Ranunculaceæ,** 14
Stamens on the calyx: leaves compound, mostly radical.....**Rosaceæ,** 48

* * *Pistil only one, simple or compound.*

a. *Shrubs, trees or woody climbers.*

Style and stigma one.
- Sepals, petals and stamens 6 each, opposite each other..........**Berberidaceæ,** 17
- Sepals, petals and stamens 4 or 5 each (or stamens 8 in 1st).
  - Strongly aromatic or heavy-scented..........................**Rutaceæ,** 36
  - Not aromatic: leaves simple, opposite..................**Celastraceæ,** 37
  - A vine climbing by tendrils..**Vitaceæ,** 38
- Calyx 2-lipped: petals unequal: stamens 5-8, exserted............**Sapindaceæ,** 38
- Calyx 4-toothed: petals 2: stamens 2 to 4: fruit winged..............**Oleaceæ,** 77
- Calyx 4-cleft: petals 4: stamens 6: ovary long-stiped................**Isomeris,** 25
- Calyx 4-toothed: petals 5, unequal: stamens 10.................**Leguminosæ,** 39
- Sepals 3 or 5, unequal: stamens 4 to 8, united below...........**Polygalaceæ,** 26

Styles or stigmas more than one.
- Styles 2: leaves opposite: fruit 2-winged.......................**Sapindaceæ,** 38
- Styles 3-cleft: stamens 5, opposite small petals.................**Rhamnaceæ,** 37
- Stigmas 3: leaves alternate, 3-foliolate or simple..............**Anacardiaceæ,** 39
- Stigmas 4 or 5: prostrate stems hardly woody.................**Saxifragaceæ,** 54
- Stigma 5-lobed: small shrub: leaves opposite or whorled............**Ericaceæ,** 71

b. *Herbs: leaves mostly or all radical.*

- Stamens 1 or 3: sepals 2: petals 2 to 5: stigmas 2 or 3.........**Portulacaceæ,** 31
- Stamens 5, anthers united: lower petal spurred: style 1............ **Violaceæ,** 26
- Stamens 5, opposite the petals. Sepals 2: style 3-cleft.........**Portulacaceæ,** 31
  - Sepals colored, united: styles 5..**Plumbaginaceæ,** 57
- Stamens, sepals and petals 5 each: styles 3 or 6: very glandular..**Droseraceæ,** 58
- Stamens 5 or 10, on the calyx: style 2 or 3....................**Saxifragaceæ,** 54
- Stamens 10, on the receptacle: stigma 5-lobed.....................**Ericaceæ,** 71
- Stamens 10, styles 5: leaves 3-foliolate...............**Oxalis in Geraniaceæ,** 36
- Stamens 6 united in 3's: sepals 2: petals 4 in unequal pairs......**Fumariaceæ,** 19
- Stamens 6: flowers nodding on a scape.........**Vancouveria in Berberidaceæ,** 17

c. *Herbs: leaves alternate.*

Corolla regular (petals alike) or nearly so.
- Stigma 1, often 2-lobed: stamens 6 (2 and 4).......................**Cruciferæ,** 19
  - stamens 6, equal: ovary on a stipe..................**Capparidaceæ,** 25
  - stamens 4 to 7 and as many petals on the calyx........**Lythraceæ,** 59
- Stigma 2-lobed: stamens 4: petals 2: sepals 2, white.............***Maianthemum,*** 119
- Stigmas 5: sepals 5: petals 5: stamens 10.......................**Geraniaceæ,** 36

Styles 2 or 3: sepals 5: petals 5: stamens 5 or 10: leaves petioled	Saxifragaceæ,	54
Styles 2 to 5: sepals 5: petals 5: stamens 5: leaves sessile	Linaceæ.	35
Style 3-cleft: sepals 2: petals 5: fleshy leaves	Portulacaceæ,	31
Corolla irregular (petals not all alike): style one.		
Stamens 10, included by the cohering lower pair of petals	Leguminosæ,	39
Stamens 5: anthers united: lower petal spurred	Violaceæ,	26
Stamens 6, united in 3's: petals 4, in pairs	Fumariaceæ,	19
Stamens 6, unequal, distinct or 2 united	*Streptanthus*,	22
Stamens 6 to 8, united: ovary 2-celled: leaves entire	Polygalaceæ,	26

d. *Herbs: leaves opposite, simple, except in the last.*

Style 3-cleft: stamens 3 to 5: leaves a single pair	Portulacaceæ,	31
Style none, stigmas 3: stamens 10 to 12: petals 6: leaves in 3's	Papaveraceæ,	18
Styles 3: flowers sessile: stamens 4 to 7: leaves revolute	Frankeniaceæ,	27
Styles 3: flowers in axillary clusters: stamens 3 to 5	*Mollugo*,	65
Styles 2 to 5: capsule 1-celled: stamens 10 or 5	Caryophyllaceæ,	27
Styles 2: capsule 4-celled: stamens 5	Linaceæ,	35
Styles 4 or 5: small white flowers in terminal clusters	Saxifragaceæ,	54
Style 1: stamens on the slightly cohering rotate petals	Primulaceæ,	76
Styles and other flower parts each 2 to 5 (stamens rarely twice as many)	Elatinaceæ,	33
Styles or stigmas 5: 5 akenes separating when ripe	Geraniaceæ,	36

2. Ovary and fruit inferior or mainly so.

Shrubs: sepals, petals and stamens each 4 or 5: leaves simple.		
Stamens opposite the small clawed petals: style 3-cleft	Rhamnaceæ,	37
Sepals petaloid: ovary globose; styles or stigmas 2	Saxifragaceæ,	54
Sepals, petals and stamens 4 each: the flowers in cymes or in heads with a white involucre	Cornaceæ,	66
Herbs. Sepals 5: petals 5: styles 2 to 5: leaves simple	Saxifragaceæ,	54
Flowers or flower clusters axillary.		
Flower parts in 2's or 4's, small: aquatic: leaves whorled	Halorageæ,	59
Flower parts in 4's (rarely in 2's or 6's): style 1	Onagraceæ,	59
Flowers monœcious: climbing by tendrils	Cucurbitaceæ,	64
Flowers in umbels or heads not axillary.		
Flowers in umbels or heads: petals 5: stamens 5.		
Styles 2: fruit dry	Umbelliferæ,	65
Styles 2 to 5: fruit juicy	Araliaceæ,	13
Flowers in a head with involucre of 4 white leaves	Cornaceæ,	66

DIVISION 2.—GAMOPETALÆ.

A. OVARY INFERIOR (adherent to the calyx) or mainly so.

Stamens 8 or 10: corolla-lobes 4 or 5: shrubs.................................**Ericaceæ**, 71
Stamens 10, those alternate with small corolla-lobes sterile, inflexed........*Samolus*, 77
Stamens 5 (rarely 4), united into a tube.
Style 2-cleft: flowers in a flower-like head........................**Compositæ**, 69
Style and stigma entire: flowers irregular. (See p. 13)...........**Lobeliaceæ**, 69
Stamens 4 or 5, distinct, growing at the base of the corolla.......**Campanulaceæ**, 70
Stamens on the corolla-tube: leaves opposite or whorled.
Leaves connate: corolla 4-lobed: stiff, prickly herbs..................*Dipsacus*, 69
Leaves opposite, corolla mostly 5-lobed.......................**Caprifoliaceæ**, 66
Leaves whorled or sometimes opposite: corolla 4-lobed.............**Rubiaceæ**, 68
Leaves unequal: prostrate: calyx corolla-like. (See Cal. Flora.).......*Abronia*.
Stamens only 3: corolla 5-6-lobed: calyx-lobes minute or none. Herbs.
Leaves opposite; stamens distinct: erect herbs.................**Valerianaceæ**, 68
Leaves palmately nerved, alternate: tendril-bearing vines......**Cucurbitaceæ**, 64
Stamens apparently 1, really 3 united: flowers monœcious.........**Cucurbitaceæ**, 64

B. OVARY SUPERIOR (free from the calyx) or nearly so.

1. Flowers regular or nearly so.

* *Stamens twice as many as the lobes of the corolla.*

Corolla bell-shaped or inflated-ovoid.......................................**Ericaceæ**, 71
Corolla deeply 5-8-cleft, the base united with the filaments...........**Styracaceæ**, 77
Corolla 5-cleft: pistils or styles 5: fleshy herbs.........................**Crassulaceæ**, 57

* * *Stamens as many as the corolla-lobes.*

a. Style 1, stigma 1: leafless, root-parasite.... ....Pholisma, 75
b. Style 1, stigma 1: leaves entire (lobed in the first and last).
Leaves mostly radical, reniform: stamens unequal.....................*Romanzoffia*, 87
Leaves all radical; flowers spicate, colorless, scarious..............**Plantaginaceæ**, 109
corolla reflexed: anthers purple-black..............*Dodecatheon*, 76
Leaves alternate. Spikes coiled: ovary in 4 parts.................**Borraginaceæ**, 87
Flowers rotate to funnelform or tubular............**Solanaceæ**, 92
Tall shrub: 3 to 5 calyx-like bracts: flowers yellow....*Fremontia*, 35
Leaves opposite (at least below), entire: juice milky: ovaries 2; stigmas united.
Flowers white or pinkish in terminal cymose clusters...........**Apocynaceæ**, 77
Flowers in umbels: sepals and petals reflexed or rotate.......**Asclepiadaceæ**, 77
Leaves opposite, ovate, sessile: flowers rotate, axillary, solitary..........*Anagallis*, 77
Leaves clustered at the top of the stem, bracts below: corolla rotate...... *Trientalis*. 76

c. Style one or none, stigmas two.

Leaves opposite or whorled, sessile, entire..........................**Gentianaceæ**, 79

Leaves opposite, lobed: flowers small in spikes......................**Verbenaceæ**, 105

Leaves alternate or radical, 3-foliolate: corolla bearded...................*Menyanthes*, 80

Leaves alternate. Flowers not axillary.......................**Hydrophyllaceæ**, 84

    Flowers in a head with acerose bracts...................*Gilia*, 80

    Flowers funnelform: twining or creeping vines.........*Convolvulus*, 91

Leaves radical: flowers solitary on scapes...............................*Hesperochiron*, 87

d. Style 1, stigmas 3...**Polemoniaceæ**, 80

e. Style 2-cleft..**Hydrophyllaceæ**, 84

f. Styles 2: leaves simple and alternate or none.

Flowers solitary, axillary, white: leaves silky...................................*Cressa*, 91

Flowers clustered on filiform, leafless orange or yellow twining stems........*Cuscuta*, 91

Flowers 5 or 6 lines long: shrubs or wood-based herbs..........**Hydrophyllaceæ**, 84

* * * *Stamens fewer than the lobes of the slightly irregular corolla.*

Stamens 4: flowers in slender spikes: leaves opposite, lobed..........**Verbenaceæ**, 105

Stamens 3: style 3-cleft: sepals 2: leaves opposite, entire........................*Montia*, 32

Stamens 2 or 4: ovary 2-celled...............................**Scrophulariaceæ**, 93

2. Flowers irregular: style 1; stigma entire or 2-lobed.

Leaves or scales not opposite.

    Corolla flattened, heart-shaped: stamens 6, united in 3's...............*Dicentra*, 19

    Corolla curved: leafless root-parasites: stamens 4..............**Orobanchaceæ**, 104

    Corolla more or less 2-lipped: ovary 2-celled: stamens 2 to 5..**Scrophulariaceæ**, 93

    Corolla 2-lipped, spurred: ovary 1-celled: stamens 2: aquatic..**Lentibulariaceæ**, 104

Leaves opposite or whorled: stamens 2 or 4.

    Ovary 2-celled...**Scrophulariaceæ**, 93

    Ovary 4-parted, forming 4 seed-like nutlets.........................**Labiatæ**, 105

    Ovary 2-4-lobed: small flowers in spikes or heads................**Verbenaceæ**, 105

DIVISION 3.—APETALÆ.

A. OVARY INFERIOR (calyx adherent) or apparently so.

Leaves cordate: calyx 3-lobed: ovary 6-celled. (See Cal. Flora)..**Aristolochiaceæ.**

Leaves palmately lobed tendril-bearing vines.......................**Cucurbitaceæ**, 64

Leaves pinnate: calyx-tube 3-4-angled, prickly.................................**Rosaceæ**, 48

Leaves unequally pinnatifid: calyx-tube in fertile flowers 3-toothed........*Datisca,* 64
Leaves glaucous: white flowers in clustered umbels.....................*Comandra.*
Leaves small, crenate: capsule axillary, obcordate.................*Chrysosplenium,* 56
Leaves opposite. Calyx salverform: capsule 1-seeded. (See Flora)..**Nyctaginaceæ.**
Calyx 4-lobed: stamens 4: flowers axillary.............*Ludwigia,* 60
Calyx (corolla) tubular to rotate................**Caprifoliaceæ,** 66
Leaves in whorls. Calyx 4-lobed or entire. Aquatic................**Halorageæ,** 59

B. OVARY SUPERIOR (free from the calyx).

a. Herbs: leaves alternate, radical or in a whorl.

Sepals petaloid, persistent; akene 1, 3-sided or flat. (See Flora)....**Polygonaceæ.**
persistent: fleshy root-parasite, waxy-white bracts.......*Allotropa,* 74
deciduous: carpels several or many...............**Ranunculaceæ,** 14
Sepals green: racemes close: capsules flat, 1-2-celled....................**Cruciferæ,** 19
minute flowers opposite the leaves.......................*Alchemilla,* 52
Sepals none: dense oblong spike with petaloid involucre. (See Flora)....*Anemopsis,*
spike naked: radical leaf 3-foliolate..........................*Achlys,* 17

b. Herbs: leaves opposite entire: capsule 1-celled except in the last.

Stems square: calyx 4-toothed, with smaller teeth between, axillary......*Ammania,* 59
Involucre calyx-like or surrounding a head of flowers. (See Flora)..**Nyctaginaceæ.**
Flowers small, axillary, sessile white: stigma 1............................*Glaux,* 76
Flowers green, terminal: stigmas 3 to 5........................**Caryophyllaceæ,** 27
Flowers axillary: capsule 3-5-celled..................................**Ficoideæ,** 65

c. Shrubs or trees: leaves alternate, entire (except in the last): flowers perfect.

Calyx tubular, bearing the stamens: akene plumose-tailed.............*Cercocarpus,* 50
Calyx 6-parted, yellowish: leaves very aromatic. (See Flora)..........**Lauraceæ.**
Calyx 4-5-cleft, greenish: fruit berry-like, 2-4-seeded...............**Rhamnaceæ,** 37
Calyx 3-4-lobed, yellow: stamens 6 to 12, exserted..................*Dirca palustris.*
Calyx 5-cleft, large, yellow: stamens 5, united.....................**Sterculiaceæ,** 35

d. Trees or woody climbers with opposite pinnate leaves.

Trees: flowers diœcious: winged fruit in drooping panicles................**Oleaceæ,** 77
flowers perfect: fruit 2-winged, 2-seeded.....................**Sapindaceæ,** 38
Climbers: sepals 4: stamens and pistils many: akenes tailed...............*Clematis,* 14

e. Diœcious shrubs with drooping silky gray aments.......................Garrya, 66

CLASS II.—ENDOGENS OR MONOCOTYLEDONS.

A. OVARY SUPERIOR (Perianth not adherent).

Pistils 8 to many distinct or united carpels: flowers in whorls.........Alismaceæ, 109
Pistil 3-carpeled, ovary 3-celled, or at least 3-sided.....................Liliaceæ, 113
Pistil 2-celled: red flowers in an umbel..................................*Clintonia*, 123
small perianth 4-parted: stamens 4..................*Maianthemum*, 119

B. OVARY INFERIOR (Perianth adherent).

Flowers irregular: anthers 1 or 2 on the pistil.......................Orchidaceæ, 110
Flowers regular: anthers 3, extrorse....................................Iridaceæ, 112

ADDENDA.

After Umbelliferæ, p. 65, add:—

ARALIACEÆ.

A tall herb: leaves bipinnate or pinnate, very large: pedicels jointed.................	1
Stem woody, prickly, 6-12 ft. high: leaves palmately lobed: pedicels not jointed......	2

1. ARALIA, Linnæus.

1. **A. Californica,** Watson. Root large, aromatic, used medicinally. (*Spikenard.*)

2. FATSIA, Bentham & Hooker.

1. **F. horrida,** B. & H. Common in the forests of Oregon and northward.

LOBELIACEÆ.

After Nemacladus, p. 69, add:—

1a. HOWELLIA, Gray.

1. **H. aquatilis,** Gr. Aquatic: submersed leaves slender, mostly alternate, entire; those above water broader and shorter, sometimes 1-2-toothed: flowers short-peduncled, axillary; corolla-lobes nearly equal, not surpassing the calyx. Ponds on Sauvies Island, Columbia River.

DIVISION I. POLYPETALÆ

RANUNCULACEÆ.

* *Petals and sepals similarly colored.*

Sepals and petals slender: carpels 3 to 8 on stipes: smooth; evergreen	8
Petals 5 spur-like sacs: follicles 5: flowers nodding: leaves compound	10
Upper sepal with a spur enclosing spurs of two petals: petals 4	11
Upper sepal a hood enclosing spurs of two petals	12
Minute white flowers in dense capitate racemes: pistil single	13
Flowers pinkish or whitish on scapes	6
Flowers solitary on scapes: receptacle elongated: leaves slender, entire	5

* * *Petals and sepals not similarly colored.*

Petals yellow white or pinkish: akenes small, beaked	6
Petals fleshy, dull purple: follicles large: leaves glaucous	14

* * * *Petals wanting: sepals petaloid.*

Woody climbers: leaves opposite: sepals 4: akenes plumose	1
A whorl of leaves below the flower: akenes many	2
Leaves cordate: sepals greenish, large: follicles 5 to 12	7
Leaves 2-3-ternately compound: follicles pointed	9
Flowers small, greenish, in panicles: leaves 2-3-ternate	3
Flowers small, white; panicles corymbose, akenes 4-angled, inflated	4

1. CLEMATIS, Linnæus.

1. **C. ligusticifolia**, Nuttall. Leaves 5-foliolate: sepals white, silky.
2. **C. lasiantha**, Nutt. Leaves 3-foliolate: peduncles 1-2-bracteate.
3. **C. pauciflora**, Nutt. Leaves fascicled: akenes smooth.
4. **C. verticillaris**, DC. Flowers bluish purple, large, solitary.

2. ANEMONE, Linnæus.

1. **A. occidentalis**, Watson. Akenes plumose-tailed: alpine.
2. **A. multifida**, DC. Akenes densely woolly: sepals villous.
3. **A. nemorosa**, Linn. Leaves 3, petioled, ternate, incisely lobed.
4. **A. deltoidea**, Hooker. Leaves usually entire, serrate.

3. THALICTRUM, Tournefort.

1. **T. polycarpum**, Watson. Akenes in dense heads, 2 or 3 lines long.
2. **T. occidentalis**, Gray. Akenes 1 to 6, 3 or 4 lines long, narrower.
3. **T. sparsiflorum**, Turcz. Anthers obtuse; fruit heads nodding.

4. TRAUTVETTERIA, Fischer & Meyer.

1. **T. grandis**, Nutt. Slender: leaves few, 5-7-lobed, laciniate-toothed.

5. MYOSURUS, Linnæus.

1. **M. minimus**, Linn. Receptacle in fruit 1 or 2 inches long.
2. **M. aristatus**, Benth. Receptacle shorter, akenes beaked.
3. **M. sessilis**, Watson. Flowers sessile: fruit heads 2 to 6 lines long.

6. RANUNCULUS, Linn.

* *Aquatic: leaves round-reniform and lobed or, when submersed, filiform-dissected.*

Petals white: akenes wrinkled crosswise. **1, 2**
Petals yellow: akenes not wrinkled **6**

* * *Not aquatic: leaves all radical: scapes naked or 1-2 bracteate, mostly 1-flowered: sepals petaloid.*

Sepals white: petals minute: leaves cordate or reniform **3**
Sepals pinkish, persistent petals pink: leaves compound **4**

* * * *Usually growing in wet places.*

Leaves all entire, oval or narrower **7, 8, 9, 10**
Leaves rather fleshy, simple or 3-foliolate; lobes rounded **5, 12**

* * * * *Not aquatic but some species growing in wet places: leaves variously divided or lobed.*

Alpine, tufted: leaves round-reniform to cuneate, small **11**
Some or all the leaves ternately compound: stems branching.
Petals usually more than 6 .... **15**
Petals usually 5 .... **13, 16, 17, 18, 19**

1. **R. aquatilis**, Linn. **var. heterophyllus.** Sepals deciduous: receptacle hairy.
2. **R. Lobbii**, Hiern. Sepals persistent enclosing the few akenes.
3. **R. hystriculus**, Gray. Akenes 2 or 3 lines long, tapering; beak hooked.
4. **R. Andersoni**, Gr. Akenes bladdery, 4 or 5 lines long.
5. **R. Cymbalaria**, Pursh. Akenes enlarging upward; beak oblique.
6. **R. multifidus**, Pursh. Petals 5 to 8 with a large scale; beak straight.
7. **R. pusillus**, var. **Lindheimeri**, Gr. Akenes granulate.
8. **R. Flammula**, Linn. **var. reptans**, Gr. Akenes subglobose.

9. R. **alismæfolius**, Geyer. Smooth: akenes in globose head.
10. R **Lemmoni**, Gr. Sepals villous: akenes pubescent.
11. R **oxynotus**, Gr. Leaves small: sepals hairy: heads oblong.
12. R. **Bloomeri**, Watson. Akenes straight-beaked.
13. R. **occidentalis.** Akenes flat, often rough; beak curved.
14. R. **canus**, Benth. Densely soft villous when young.
15. R. **Californicus**, Benth. Petals narrowly obovate, 6 to 20.
16. R. **hispidus**, Michx. Hispid: calyx scarcely reflexed.
17. R. **orthorhynchus**, Hooker. Akenes nearly 2 lines long.
18. R. **hebecarpus**, Hook. & Arn. Flowers minute: akenes bristly.
19. R. **muricatus**, Linn. Akenes prickly, large, strong-beaked.

7. CALTHA, Linnæus.

1. C. **leptosepala**, D C. Scape-like stems 1-flowered.

8. COPTIS, Salisbury.

1. C. **asplenifolia.** Salis. Small petals pouched: sepals slender.
2. C. **occidentalis**, T. & G. Petals not pouched, linear. Or.

9. ISOPYRUM, Linnæus.

1. I. **occidentalis**, Hook. & Arn. Several flowers: follicles 6 lines long.
2. I. **stipitatum**, Gray. One flower: follicles stipitate, 3 lines long, obtuse.
3. I. **Hallii**, Gray. Large: 7 to 9 flowers: follicles smaller, acuminate.

10. AQUILEGIA, Tournefort.

1. A. **truncata**, F. & M. Petals truncate, red, yellow-tinged, Cal.
2. A. **formosa**, Fischer. Similar: petals longer outside. Oregon.
3. A. **cærulea**, James. Flowers blue to white: spurs very slender.

11. DELPHINIUM, Tourn.

Flowers blue, purple or white, in terminal racemes.	
Capsule pubescent	1, 2, 3, 5
Capsule glabrous	4, 6, 7, 8
Flowers red or yellowish in loose racemes.	9, 10

1. D. **simplex**, Douglas. Stem and raceme strict: sepals 4 or 5 lines long.
2. D. **variegatum**, T. & G. More hairy raceme loose: sepals 6 to 10 lines long.
3. D. **Menziesii**, DC. A longer spur: upper petals purple-veined.
4. D. **decorum**, F & M. Usually smooth: flowers like the last.
5. D. **depauperatum**, Nuttall. Smaller: possibly variety of the last.

6. D. **Californicum**, T. & G. Dull blue flowers velvety: raceme close.
7. D. **glaucum**, Watson. Glaucous: pale blue flowers: raceme narrow.
8. D. **trollifolium**, Gray. Smooth: leaves shining: flowers large.
9. D. **nudicaule**, T. & G. Follicles narrowed at base: 6 to 12 lines long.
10. D. **cardinale**, Hooker. Follicles broader at base, shorter: flowers larger.

12. ACONITUM, Tournefort.

1. A. **Columbianum**, Nutt. Blue flowers or rarely white: hood beaked.

13. ACTÆA, Linnæus.

1. A. **spicata, var. arguta**, Torrey. Leaves 2-3-ternate: berries red.

14. PÆONIA, Linn.

1. P. **Brownii**, Dougl. Leathery sepals persistent: seeds 5 or 6 lines long.

BERBERIDACEÆ.

Low shrubs with spiny-toothed pinnate leaves: flowers yellow........................ 1
Herb: leaves radical, ternately compound: flowers nodding, white.................... 2
Herb: radical 3-foliolate leaf solitary: sepals and petals wanting...................... 3

1. BERBERIS, Linnæus.

1. B. **repens**, Lindley. Leaflets 3 to 7, ovate, not shiny: not a foot high.
2. B. **Aquifolium**, Pursh. Leaflets 7 or more, shiny: berries globose.
3. B. **pinnata**, Lag. Petiole short or leaflets at the base: fruit long-ovoid.
4. B. **nervosa**, Pursh. Leaflets palmately nerved, 11 to 17.

2. VANCOUVERIA, Morren & Decaisne.

1. V. **hexandra**, M. & D. Panicle of white flowers on a scape.
Var. **aurea**. Flowers yellow, larger. S. W. Or. (*V. aurea*, Greene.)

3. ACHLYS, De Candolle.

1. A. **triphylla**, DC. Scape ending in a slender spike of minute flowers.

NYMPHÆACEÆ.

Leaves elliptic-peltate, floating: stems jelly-coated.................................. 1
Leaves oblong-cordate, large: flowers large, globose, yellow......................... 2

1. **BRASENIA**, Schreber.

1. **B. peltata**, Pursh. **Leaves 2 to 4 inches long: white or purplish flowers.**

1. **NUPHAR**, Smith.

1. **N. polysepalum**, Engelm. **Leaves 6 to 12 inches long: stigma broad.**

SARRACENIACEÆ.

Darlingtonia Californica, Torrey. **Hooded tubular leaves with a pair of mustache-like appendages above the opening: solitary flower nodding on a bracteate scape.**

PAPAVERACEÆ.

* *Herbs with entire narrow leaves; the uppermost whorled or opposite: sepals 3, caducous: petals 6 in 2 rows, white or yellowish.*

Filiform stigmas 6 to many; ovaries forming a cylinder 1
Stigmas 3; capsule triangular-ovoid to obovoid or linear 2

* * *Herbs with divided or lobed alternate leaves.*

Sepals 3, winged on the back: half shrubby 3
Sepals 3 or 2, sharp-horned: bristly with stiff prickles 4
Sepals 2: stigma slightly 4-8-lobed: slender purplish filaments 5
Sepals united into a conical cap: slender stigmas unequal 6

* * * *Shrubs or woody based perennials.*

Sepals 2: buds globular: stigmas 2: leaves entire 7
Sepals 3: petals 6, very large, white: leaves pinnatifid 8

1. **PLATYSTEMON**, Bentham.

1. **P. Californicus**, Benth. Hirsute: peduncles long, axillary.

2. **PLATYSTIGMA**, Bentham.

1. **P. lineare**, Benth. Hirsute: stems short: peduncles long: stamens many.
2. **P. Californicum**, B. & H. Capsule 9 to 15 lines long: stamens 10 to 12.
3. **P. Oreganum**, B. & H. Capsule shorter: stamens 4 to 6: smaller.
4. **P. denticulatum**, Greene. Leaves denticulate: stamens 6 to 9.

3. **ROMNEYA**, Harvey.

1. **R. Coulteri**, Harv. White flowers 3 or more inches broad: glaucous leaves.

4. **ARGEMONE**, Linnæus.

1. **A. hispida**, Gray. Densely prickly, petals and stamens only excepted.

5. MECONOPSIS, Viguier.

1. M. **heterophylla,** Benth. Capsule truncate, ribbed, beaked.

6. ESCHSCHOLTZIA, Chamisso.

[Cup-like torus enclosing the ovary 2-margined; the inner membranous, the outer and lower usually thicker (First shown by E. L. Greene)].

* *Outer margin of the obconical torus a broad green or reddish rim.*

1. E. **Californica,** Cham. Smooth, perennial, often decumbent.

* * *Torus without conspicuous rim, cylindrical or nearly so.*

2. E. **Austinæ,** Greene. Erect, branching, hairy below.
3. E. **tenuifolia,** Benth. Scape-like peduncles square, very slender.
4. E. **rhombipetala,** Greene. Square peduncles rough, stout: petals fugacious.

7. DENDROMECON, Bentham.

1. D. **rigidum,** Benth. Leaves ovate or narrower, rigid, vertical.

FUMARIACEÆ.

Corolla flattened heartshaped or 2-spurred at base........................ 1
Corolla 1-spurred at base, deciduous........................ 2

1. DICENTRA, Borkhausen.

* *Flowers drooping on a scape: filaments lightly united.*

1. D. **formosa,** DC. Raceme com'pd: persistent petals united, rose color.
2. D. **uniflora,** Kellogg. Flower solitary, ½ inch long: capsule short.
3. D. **pauciflora,** Watson. Flowers 1 to 3, 8 to 12 lines long: capsule exserted.
4. D. **cucullaria,** DC. Raceme simple: spurs divergent.

* * *Flowers narrow, erect, in panicles on leafy stems.*

5. D. **chrysantha,** H. & A. Petals yellow, 6-9 lines long, tips widely divergent.
6. D. **ochroleuca,** Engelmann. Petals yellowish, longer, tips less divergent.

2. CORYDALIS, Ventenat.

1. C. **aurea,** Willd. **var. occidentalis,** Gr. Flowers golden yellow.
2. C. **Scouleri,** Hook. Flowers rose-colored in spreading racemes.
3. C. **Caseana,** Gr. Flowers white or cream-color, bluish tipped.
4. C. **Bidwelliæ,** Watson. Similar, but crest entire, spur curved.

CRUCIFERÆ.

§ 1. Pods splitting when ripe, the sides (valves) separating from a central pair of ribs (placentæ) which bear the seeds and usually frame a transparent partition.

* *Pods flattened parallel with the partition, the placental ribs forming the margin: radicle of the bent embryo lying against one edge of the cotyledons (accumbent).*

Pods orbicular, nerveless: flowers small, white or yellowish.

Pods large, flat: seeds orbicular, flat, thin-margined: scapes 1-flowered.............. 1
Pods less than 2 lines broad: flowers in racemes; leaves spatulate, entire............ 2
Pods ovate or lanceolate to linear or oblong not an inch long...................... 3

Pods narrowly linear, valves nerveless, partition thickened.

Pods long-beaked: stem leaves few, close together near the top..................... 4
Pods short-beaked: leaves scattered: racemes longer................................ 5

Pods linear or narrower, an inch or more long, 1-nerved: seeds flat.

Anthers short: petals white, purple or rose-color: claw narrow, blade flat............ 6
Anthers sagittate at base: petals usually unequal and crispate or twisted............ 7
Sepals broad, not colored, the outer gibbous: petals broad, blade flat................ 8

* * *Pods terete or scarcely flattened, often 4-angled: radicle lying against the side of the cotyledons or embracing them (incumbent), or turned partly to one side (oblique).*

† *Pods slender, 1 to 4 inches long; valves 1-nerved: seeds oblong, slightly flattened; cotyledons often oblique.*

Flowers white to purple: anthers sagittate.

Petals undulately crisped, little exceeding the large sepals: claw broad.............. 9
Petals with flat limb much exceeding the narrow sepals.... 10

Flowers yellow, large: stem leaves narrow, mostly entire.

Anthers linear, at length coiled: pods on long stipes, curved....................... 11
Anthers sagittate: stigma 2-lobed: pod 4-angled; no stipe........................... 12

† † *Pods linear, often less than an inch long: seeds in one row (except in 1st sp's. of No. 15 and in No. 16): at least the lower leaves pinnatifid.*

Seeds globose: cotyledons infolding the radicle: anthers sagittate.................. 13
Seeds oblong: anthers oblong: leaves lyrately pinnatifid, smooth.................... 14
Seeds oblong, small: anthers sagittate: petals 1 to 3 lines long.................... 15
Seeds in two rows: pods 4 to 6 lines long; valves nerveless......................... 16

† † † *Pods oblong-ovoid to globose, beaked with the slender style.*

Densely stellate-pubescent: leaves mostly entire: flowers yellow..................... 17

* * * *Pods flattened contrary to the narrow partition.*

Pods linear, ½ to 2½ inches long, on slender axillary peduncles...................... 18
Pods ovoid, scarcely flattened, on slender scapes. Aquatic.......................... 19
Pods linear, nearly terete: cotyledons 3-parted: petals included.................... 20
Pods angular-obcordate or oblong-obovate, many-seeded............................... 21
Pods oblanceolate to obovate or cuneate-oblong, 4-8-seeded......................... . 22
Pods orbicular to obovate, 2-winged above, 2-seeded................................. 23

§ 2. Pods not splitting open when ripe: petals minute or wanting except in the last.

Pods with 2 small globular seed-like cells, rough..................................... 24

Pods elliptical, twisted, flat, 2 lines long, 6-10-seeded.................................. 25
Pods minute, orbicular, bristly with hooked hairs, 1-seeded.......................... 26
Pods orbicular or obovate, broadly margined, plano-convex, 1-seeded............... 27
Pods terete, spongy-inflated, tapering above, an inch or more long................... 28

1. PLATYSPERMUM, Hooker.

1. **P. scapigerum**, Hook. Glabrous. leaves mostly runcinately lobed. S. N. Mts.

2. ALYSSUM, Tournefort.

1. **A. calycinum**, L. Petals white or yellowish: sepals persistent: pods 4-seeded.
2. **A. maritimum**, L. Petals white: pods 2-seeded (known as Sweet Alyssum).

3. DRABA, Linnæus.

Stems leafy. Nos. 1 to 4. Stems scape-like, few-flowered, not annuals. Nos. 5 to 10.

1. **D. cuneifolia**, Nutt. Hirsute, 1 to 6 inches high: petals white, 1 or 2 lines long.
2. **D. stenoloba**, Ledeb. Larger, montane or alpine: petals yellow, obtuse.
3. **D. aureola**, Watson. Densely stellate-hairy: raceme dense: petals yellow.
4. **D. corrugata**, Watson. Pubescence coarser: racemes looser: pod contorted.
5. **D. crassifolia**, Graham. Glabrous: yellow petals a line long: pods acute.
6. **D. Douglasii**, Gr. Glaucous: scapes 6 to 18 lines long: petals white.
7. **D. Lemmoni**, Wats. Stout caudex branching: scapes an inch high: petals yellow.
8. **D. eurycarpa**, Gr. Pod ovate, beaked, 5 to 10 lines long. Sonora Pass.
9. **D. alpina**, L. Petals yellow, 1½ to 2½ lines long. Alpine.
10. **D. Howellii**, Watson. Similar: petals 3 or 4 lines long: pods often one-sided. N.W. Cal.

4. DENTARIA, Linnæus.

1. **D. tenella**, Pursh. Leaves 1 to 3, 2-5-parted: flowers 3 to 6 lines long.
2. **D. Californica**, Watson. Leaves 2 to 4, toothed, rarely 3-lobed: petals rose-color.

5. CARDAMINE, Linnæus.

Leaves pinnate with several pairs of small leaflets................................... 1, 2, 3
Leaves pinnate with larger leaflets, or simple.
Radical leaves 5-7-foliolate; stem leaves with 5 to 9 entire leaflets.................... 4
Radical leaves mostly simple; stem leaves 3-5-foliolate.................................. 5, 6
Leaves all ternate, the leaflets 3-5-lobed or toothed: tall.................................. 7
Leaves all simple; margin sinuate or entire.. 8, 9

1. **C. Gambelii**, Watson. Leaflets 9 to 13, sessile, acute: petals 4 lines long.
2. **C. oligosperma**, Nutt. Leaflets 7 to 11, petiolulate: petals 1 to 1½ lines long.
3. **C. hirsuta**, L. Stouter: leaflets sessile: flowers larger in longer racemes.

4. C. **cuneata**, Greene. Tuberiferous like the next: leaflets petiolulate.
5. C. **paucisecta**, Benth. Petals 6 to 9 lines long, white or pinkish.
6. C. **Breweri**, Watson. Terminal leaflet much the largest: petals 2 lines long.
7. C. **angulata**, Hook. Flowers few, 3 to 4 lines long: pods short. Oregon.
8. C. **cordifolia**, Gr. Stout: leaves cordate-orbicular or narrower.
9. C. **bellidifolia**, L. Alpine, tufted, 2 or 3 in. high: leaves entire.

6. ARABIS, Linnæus.

Pods straight, strictly erect or ascending.

Flowers white, 2 or 3 lines long, in dense elongated racemes	1, 2
Flowers light pink or rose color, 2 or 3 lines long. Alpine	3, 4
Flowers rose-purple, 6 to 9 lines long: leaves dark green, ciliate	5

Pods curved and usually (except No. 6) more or less reflexed.

Pods 3 in. long, ascending: stout, 2 ft. high, branching	6
Pods 1 to 4 in. long, strongly reflexed: stem erect, ½ to 2 ft. high	7, 8
Pods 3 or 4 in. long, scarcely a line wide, spreading, recurved	9
Pods similar, shorter: stem simple, 2 to 10 in. high, villous	10

1. A. **perfoliata**, Lam. Glaucous, stout, 2-4 ft. high: leaves crowded clasping.
2. A. **hirsuta**, Scop. Smaller, more hairy: pods half as long, 1-2 in. Or.
3. A. **Lyallii**, Watson. Bright green or glaucous, slender: leaves clasping.
4. A. **platysperma**, Gr. Canescent with stellate hairs: pods 2 lines wide.
5. A. **blepharophylla**, H. & A. Smooth, often tufted. Coast. Monterey to S. F.
6. A. **repanda**, Watson. Leaves 3-4 in. long, sinuate toothed: petals 2-3 lines long.
7. A. **Holboellii**, Hornem. Petals 3-4 lines long, white to purple, reflexed.
8. A. **subpinnatifida**, Watson. Leaves coarsely toothed: petals pinkish.
9. A. **arcuata**, Gr. Canescent, hairs branching: petals violet 4-6 lines long.
10. A. **Breweri**, Watson. Petals deep rose, 1-4 lines long: sepals purplish.

7. STREPTANTHUS, Nuttall.

Glabrous or glaucous: stem-leaves clasping by cordate or sagittate base.

Stem-leaves thick, usually toothed, cordate to narrowly ovate	1
Stem-leaves rounded cordate, often crowded, entire: pods curved	2
Stem-leaves ovate to lanceolate, acute: pods nearly straight, slender	3
Stem-leaves spatulate: sepals broad, 3 lines long: petal-blades purple	4
Stem-leaves very narrow, pinnatifid; or some entire, small and cordate	5
Stem-leaves very slender, margins involute: outer larger sepals subcordate	6
Glaucous: racemes zigzag: calyx subglobose, black purple	7

More or less hispid with simple hairs: flowers purple or red.

Stem-leaves auriculate-clasping, toothed: racemes one-sided	8, 9
Stem-leaves scarcely clasping: raceme short: flowers often recurved	10

Stem-leaves an inch or less long, not clasping: flowers and pods erect............... 11

1. S. **cordatus,** Nutt. Petals 4-6 lines long, yellowish to purple.
2. S. **tortuosus,** Kellogg. Petals similar: pods narrower (a line wide).
3. S. **Breweri,** Gr. Petals 3-5 lines long, purple: pods 1½ to 2½ in. long.
4. S. **Howellii,** Watson. Collected in S.W. Or. by Thos. Howell in 1884.
5. S. **diversifolius,** Watson. Pods strongly reflexed, slender. Cosumnes River.
6. S. **polygaloides,** Gr. Sepals yellow: petals purple scarcely exserted.
7. S. **niger,** Greene. Petals with purple claw and minute veinles white blade.
8. S. **peramænus,** Greene. calyx magenta: blade cf petals white, purple-veined.
9. S. **glandulosus,** Hook. Petals red-purple, 6 to 8 lines long.
10. S. **hispidus,** Gr. Hirsute, 2-5 in. high: red-purple petals 4-6 lines long.
11. S. **flavescens,** Hook. Petals yellowish, linear: sepals half as long, acute.

8. CHEIRANTHUS, Linnæus.

1. C. **Menziesii,** B. & H. Smooth stems scape-like: petals purple. This is *Phœnicaulis Menziesii,* Greene (the generic name given by Nuttall).
2. C. **asper,** C. & S. Stems erect, leafy: petals orange or yellow.

9. CAULANTHUS, Watson.

1. C. **procerus,** Wats. Glabrous, 4 to 7 ft. high, stout, branching: flowers greenish.

10. THELYPODIUM, Endlicher.

1. T. **brachycarpum,** Torr. Stem 1 to 5 ft. high: petals slender, white. S. N. Mts.
2. T. **flavescens,** Watson. Sepals hairy, yellowish: pod 1½ in. long.
3. T. **lasiophyllum,** Greene. (*Sisymbrium reflexum* Nutt.) Leaves pinnatifid: stems 1 to 5 ft. high: pods deflexed or erect.

11. STANLEYA, Nuttall.

1. S. **pinnatifida,** Nutt. Stems several, 1 to 8 ft. high: petals narrow.

12. ERYSIMUM, Linnæus.

1. E. **asperum,** DC. Canescent, leafy: petals 8 to 12 lines long.

13. BRASSICA, Linnæus.

1. B. **nigra,** Boiss. Leaves petioled: pods 4-angled, 6 to 9 lines long.
2. B. **campestris,** L. Upper leaves clasping: pods 2 or 3 in. long; beak long.
3. B. **Sinapistrum,** Boiss. Rough-hairy: pods 1 to I½ in. long, ⅓ beak.

14. BARBAREA, Robt. Brown.

1. B. **vulgaris,** R. Br. Perennial, 1 to 3 ft. high: racemes dense, yellow.

Var. **arcuata,** Koch., has pods and pedicles spreading. Wet ground.

15. SISYMBRIUM, Linnæus.

Leaves 1-2-pinnate; segments usually pinnatifid: dense racemes: pods acute at both ends, 3 to 6 lines long, pedicels spreading.. 1, 2
Leaves pinnatifid or entire: pods 10 to 18 lines long.............................. 3, 4
Leaves runcinate, 3 to 6 in. long: divaricately branched.............................. 5

1. S. **canescens**, Nutt. Stems (as in all the species) branching: seeds in 2 rows.
2. S. **incisum**, Englem. Somewhat glandular: petals 1½ lines long. Montane.
3. S. **junceum**, Bieb. Glaucous: petals 3 lines long. Oregon.
4. S. **acutangulum**, DC. Hairy: leaves runcinate, 2 to 6 in. long.
5. S. **officinale**, Scop. Similar: pod 6 lines long, tapering to a point.

16. NASTURTIUM, Robt. Brown.

1. N. **curvisiliqua**, Nutt. Leaves pinnatifid: petals but little exserted.
2. N. **obtusum**, Nutt. Petals minute: pods 1½ to 3 lines long.
3. N. **officinale**, R. Br. Aquatic: petals white, 1½ to 2 lines long.

17. VESICARIA, Tournefort.

1. V. **montana**, Gr. Pods oblong-ovoid, 2½ lines long. N. Cal.
2. V. **Kingii**, Wats. Leaves 2 to 6 lines long: pods hairy, ovoid.
3. V. **occidentalis**. Flowers 4 lines long: pods globose. N. Cal.

18. TROPIDOCARPUM, Hooker.

1. T. **gracile**, Hook. Leaves pinnatifid: flowers yellow, 3 to 6 lines long. Cal.

19. SUBULARIA, Linnæus.

1. S. **aquatica**, L. Flowers minute: pods 1½ lines long. Mono Pass.

20. STANFORDIA, Watson.

1. S. **Californica**, Wats. Flowers 3 or 4 lines long on hairy pedicels, purple.

21. CAPSELLA, Moench.

1. C. **divaricata**, Walp. Very slender, diffuse: pods elliptic oblong.
2. C. **Bursa-pastoris**, Moench. Pods cuneate-obcordate. Everywhere.

22. THLASPI, Linnæus.

1. T. **alpestre**, L. Pods obovate to cuneate-oblong, not acute, beaked.
2. T. **Californicum**, Watson. Pods oblanceolate, acute, 4 or 5 lines long. N. Cal.

23. LEPIDIUM, Linnæus.

1. L. **latipes**, Hook. Stout, rigid stem, 1 to 3 in. long; leaves longer: pods long-winged.
2. L. **dictyotum**, Gr. var. acutidens Gr. Stem slender, 1 to 3 in. high.
3. L. **oxycarpum**, T. & G. Slender: petals none: stamens 2: smooth pods nodding.
4. L. **nitidum**, Nutt. Petals small: pods shining, acutely margined.
5. L. **strictum**. Often matted: sepals persistent: pods erect in dense racemes.
6. L. **Menziesii**, DC. Hispid or pubescent: petals none: pods glabrous.
7. L. **lasiocarpum**, Nutt. Rough-pubescent: pods hispid on margin.
8. L. **Virginicum**, L. Smooth stem erect, at length leafless below, paniculate.
9. L. **Draba**, L. Perennial: leaves not lobed: petals large: pods cordate.
10. L. **campestre**, L. Stout: leaves serrate: pods ovate, broadly winged, scabrous.

24. SENEBIERA, De Candolle.

1. S. **didyma**, Pers. Racemes opposite pinnatifid leaves. Ill-scented.

25. HETERODRABA, E. L. Greene.

1. H. **unilateralis**, Greene. Branching, nearly prostrate; pedicels reflexed.

26. ATHYSANUS, E. L. Greene.

1. A. **pusillus**, Greene. Very slender (*Thysanocarpus pusillus*, Hooker).

27. THYSANOCARPUS, Hooker.

1. T. **curvipes**, Hook. Leaves clasping: border of pods often perforate.
2. T. **laciniatus**, Nutt. More slender: leaves scarcely clasping: pods entire.
3. T. **radians**, Benth. Glabrous: pods with radiating ribs, 4 or 5 lines broad.

28. RAPHANUS, Linnæus.

1. R. **sativus**, L. Petals veiny, color variable: pithy pods 1 to 1½ in. long.
2. R. **Raphanistrum**, L. Similar: pods more constricted between seeds.

CAPPARIDACEÆ.

1. ISOMERIS, Nuttall.

1. I. **arborea**, Nutt. Yellow flowers in bracteate racemes: stamens exserted.

2. CLEOME, Linnæus.

1. C. **platycarpa**, Torr. Erect annual: yellow flowers corymbose; pod hanging.

CISTACEÆ.

HELIANTHEMUM, Tournefort.

H. scoparium, Nutt. Woody-based stems, slender: flowers yellow. Cent. & S. Cal.

VIOLACEÆ.

VIOLA, Linnæus.

* *Leaves all cordate and reniform.*

Stems erect or prostrate: leaves flat.. 5, 10, 11
Stemless: flowers white or blue.. 1, 2

* * *Leaves not all cordate or reniform: not lobed.*

Flowers blue or violet and white.. 3, 4
Flowers yellow.. 7, 8, 9, 10, 12

* * * *Leaves lobed or divided. Flowers yellow or yellow and purple or blue.*

Stems a few inches to a foot high.. 6, 12
Stems short or none.. 13, 14, 15

1. **V. blanda**, Willd. White flowers. Alpine in wet places.
2. **V. cucullata**, Ait. Light blue to white petals, 5 to 8 lines long.
3. **V. canina**, Linn. **var. adunca** Gr. Blue flowers, long spurred.
4. **V. cuneata**, Watson. Leaves tapering at base: flowers purple and white.
5. **V. ocellata**, T. & G. Leaves coarsely crenate: flowers white, purple marked.
6. **V. Hallii**, Gr. Gray-green: upper petals purple; lower light yellow.
7. **V. pedunculata**, T. & G. Orange-yellow petals brown on the back.
8. **V. præmorsa**, Dougl. A variable species heretofore known as *V. aurea*, Kell. Leaves ovate or narrower, crenate.
9. **V. Nuttallii**, Pursh. Leaves oblong, margins entire. N. Cal., Or.
10. **V. sarmentosa**, Dougl. Slender stems prostrate: leaves small.
11. **V. glabella**, Nutt. Leaves large, bright green, thin, acute.
12. **V. lobata**, Benth. Leaves pedately lobed or some entire.

Var. integrifolia, Watson. Leaves not lobed: coarsely toothed.

13. **V. chrysantha**, Hooker. Leaves bipinnatifid: flowers like No. 7.
14. **V. Beckwithii**, T. & G. Flowers purple or blue and yellow.
15. **V. Sheltonii**, Torr. Narrower petals yellow, purple veined.

POLYGALACEÆ.

Side sepals petaloid, larger: petals 3 united with stamens, middle one hooded and beaked.. 1
Sepals and petals 5 each, unequal: stamens 4: fruit prickly.. 2

1. POLYGALA, Tournefort.

1. P. **cucullata,** Benth. Flowers rose-color: broad beak obtuse. Cal.

2. P. **Californica,** Nutt. Flowers greenish, purplish: sepals tomentose. Cal.-Or.

2. KRAMERIA, Linnæus.

1. K. **parvifolia,** Benth. Low rigid shrub: upper petals united. San Diego.

FRANKENIACEÆ.

1. FRANKENIA, Linnæus.

1. F. **grandifolia,** C. & S. Gray-green: calyx-tube furrowed: petals pink.

CARYOPHYLLACEÆ.

* *Sepals united: petals long-clawed.*

Petals with erect bifid appendages at the base of the blade.

Styles 2 (1 sp. in No. 3). Styles 3.. 1

Styles 5, rarely 3 or 4: alpine.. 2

Petals not appendaged. Styles 2.. 3

Styles 3: petals bifid, white................ Sp. No. 6 of 1

* * *Sepals distinct or nearly so: petals without claws or appendages.*

Stipules none: petals white (or pink in No. 9): rarely wanting.

Petals bifid: pod cylindrical.. 4

Petals bifid or wanting pod globular to oblong.. 5

Petals entire or wanting: styles opposite sepals.. 6

Styles not opposite sepals.. 7

Stipules scarious: pedicel long, reflexed in fruit: leaves not rigid, fascicled, rather fleshy, filiform to linear: petals entire.. 8

Styles 3, rarely 5 (petals wanting in 3d species).. 9

Stipules scarious: pedicels bracteate or none: stamens 3 to 5: style 3-cleft, or sessile stigmas 3: petals minute or wanting.

Leaves not rigid: capsule globose.. 10

Leaves and sepals rigid: capsule 3-sided.. 11

1. SILENE, Linnæus.

* *Blade of the petals entire or only emarginate.*

Hairy: pinkish flowers in a 1-sided leafy spike.. 4

Glabrous: glutinous rings on the stem: pedicels long.. 5

Viscid-pubescent; leafy: pedicels short: petals with 4 appendages.. 21

* * *Blade of the petals bifid or 2-lobed.*

a. **Segments or lobes of the petals entire.**

Blade shortly 2-lobed: appendages entire: calyx ovoid or campanulate.

Flowers several, slender pedicelled, brownish purple.................... 2
Flowers solitary, long peduncled.................... 3
Flowers small, white: no appendages.................... 6

Blade cleft to about the middle or deeper, rose color (except 18).

Appendages notched: claw filaments and stipe woolly.................... 17
Appendages toothed: claw very narrowly auricled, smooth.................... 16
Appendages entire: claw not auricled, smooth: blade rose purple.................... 15
Appendages very small: petal lobes very narrow, white.................... 18
Appendages narrow: claw broadly auricled: petal-lobes broad.................... 19

b. Segments lobed, toothed or notched.

Lobes notched: short appendages toothed: claw not auricled.................... 16
Lobes with a tooth on the outside: claw broad, auricled.................... 22
Lobes broad: appendages notched: claw auricled.................... 20
Lobes slender, bifid: narrow claws with projecting auricles.................... 14

* * * *Blade of petals 4-6-parted.*

Flowers white or pinkish: lobes of the petals mostly filiform.

Calyx open campanulate, nodding: filaments exserted, hairy.................... 1
Calyx ovoid-cylindrical, deflexed in fruit: claws hairy.................... 10
Calyx oblong, erect, much surpassed by the rotate petals.................... 7
Calyx cylindrical, little surpassed by the equally 4-cleft petals.................... 12
Calyx little exceeded by narrow half-inch petals: filaments exserted.................... 13

Flowers scarlet or deep purple, large.

Appendages oblong-lanceolate: claw ciliate: capsule ovoid.................... 8
Appendages ovate: claw smooth: capsule oblong.................... 9
Appendages linear, half as long as the purple blade: claw slightly hairy.................... 11

1. S. **campanulata**, Watson. Filiform-disected petals reflexed.
2. S. **Lyalli**, Watson. Stems slender, glabrous: anthers included.
3. S. **monantha**, Watson. Stems weak, elongated. Columbia River.
4. S. **Gallica**, Linn. Rough-hairy: small flowers nearly sessile: annual.
5. S. **antirrhina**, Linn. Glabrous, slender: petals equaling the calyx: annual.
6. S. **Menziesii**, Hooker. Numerous weak stems: flowers small, white.
7. S. **Hookeri**, Nutt. White-tomentose, leafy: erect flowers over an inch broad.
8. S. **Californica**, Durand. Glandular-pubescent: 6 inches to several feet high.
9. S. **laciniata**, Cav. Narrower leaves: petals 4-cleft; segments entire. Cal.
10. S. **Lemmoni**, Watson. Stems many, decumbent, branched: petals white or pinkish.
11. S. **occidentalis**, Watson. Stems erect: petals 4-cleft: stipe 3 lines long.
12. S. **montana**, Watson. Auricles and appendages of petals lacerate.
13. S. **Palmeri**, Watson. Stamens and style much exserted: filaments hairy.

14. **S. Oregana**, Watson. Petals 2-parted, the segments filiform: ovary long-stiped.
15 **S. pectinata**, Watson. Viscid: calyx deeply cleft: petals deep purple.
16. **S. incompta**, Gray. Viscid, tall: lobes of the petals often toothed.
17. **S. verecunda**, Watson. Stems clustered, simple: capsule exserted.
18. **S. Bridgesii**, Rohrb. White petals very narrow: styles long.
19. **S. Douglasii**, Hooker. Similar to No. 17: ovary about equaling calyx.
20. **S. Scouleri**, Hooker. Stout: leaves distant: ovoid capsule, long-stiped. Or.
21. **S. Spaldingii**, Watson. Viscid, leafy: capsule oblong, short-stiped. Or.
22. **S. Grayii**, Watson. Cespitose, grayish: petals and appendages broad. Alpine.

2. LYCHNIS, Tournefort.

1. **L. Californica**, Watson. Petals bifid, lobes on the sides. Alpine. S. N. Mts.

3. SAPONARIA, Linnæus.

1. **S. Vaccaria**, L. Glaucous: calyx 5-angled: entire petals not appendaged. Nat.
2. **S. officinalis**, L. Calyx not angular: petals emarginate, crowned. Nat.

4. CERASTIUM, Linnæus.

1. **C. nutans**, Raf. Viscid, annual: capsule curved, long exserted. San Diego.
2. **C. arvense**, L. Downy, cespitose: capsule nearly straight, short.
3. **C. viscosum**, L. Viscid, annual: leaves broad: capsule straight, long.
4. **C. vulgatum**, L. Leaves narrower: pedicels longer: capsule broader.
5. **C. pilosum**, Ledeb. Flowers ½ in. or more broad: capsule-teeth coiled. Coast.

5. STELLARIA, Linnæus.

Bracts small and scarious or none: leaves acute.

Smooth and shining or glaucous: pedicels erect	1, 2
Glabrous: flowers in umbel-like cyme, long-pediceled	3

Bracts foliaceous: pedicels spreading or deflexed.

Glabrous: petals 2-parted, included or wanting	4
Pubescent, rather stout, 1 or 2 ft. high: petals exceeding calyx	5, 6
Pubescent, spreading: leaves ovate, petioled: petals included	7

1. **S. nitens**, Nutt. Annual: flowers erect; pedicels short: sepals 3-nerved.
2. **S. longipes**, Goldie. Often glaucous: leaves stiff: pedicels long.
3. **S. umbellata**, Turcz. Sepals 1-nerved: petals none: capsule exserted.
4. **S. borealis**, Bigelow. Stems weak: pedicels 5-7 lines long: capsule ovoid.
5. **S. Jamesii**, Torr. Viscid: leaves acuminate, long: petals 4-6 lines long.
6. **S. littoralis**, Torr. Leaves ovate, rounded at base: styles rarely 4.
7. **S. media**, Linn. Weak: a hairy line on the stem: petals included, 2-parted.

6. ARENARIA, Linnæus.

* *The 3 valves of the capsule 2-cleft or parted: cespitose perennials with linear-subulate leaves and mostly scarious bracts.*

Petals exceeding the sepals; the capsule about equaling them.................... 1, 2
Petals about equaling the sepals: leaves pungent.............................. 3, 4, 5

* * *The 3 valves entire: annuals: bracts leaf-like.*

Much branched: leaves filiform, 3-12 lines long.................................. 6, 8
Smooth: leaves lanceolate, obtuse, 1 or 2 lines long............................ 9, 10
Leaves linear to lanceolate 6-12 lines long....................................... 7, 11

* * * *Parts of the flower sometimes in 4's: capsular valves bifid: leaves bright green, 1 or 2 inches long*... 12, 13

1. A. **congesta**, Nutt. Glaucous: flowers in dense fascicles: bracts broad.
2. A. **capillaris**, Poir. Pubescent: flowers few: bracts small, lanceolate.
3. A. **pungens**, Nutt. Stems 2 or 3 inches high, leafy, pubescent. Subalpine.
4. A. **Franklinii**, Dougl. Stouter: sepals shining, margin scarious. Or.
5. A. **verna**, Linn. Leaves erect, 2-3 lines long: sepals exceeding petals.
6. A. **Douglasii**, T. & G. Capsule globose: seeds flat, smooth.
7. A. **Howellii**, Watson. Glandular-hispid, a foot high. Or.
8. A. **tenella**, Nutt. Capsule oblong: seeds rough: sepals 3-nerved. Or. N.
9. A. **Californica**, Brewer. Sepals 3-nerved: Seeds rough. Cent. Cal.
10. A. **pusilla**, Watson. Sepals 1-nerved: petals minute or none: seeds smooth.
11. A. **palustris**, Watson. Stems simple: leaves flaccid: few pedicels long.
12. A. **macrophylla**, Hooker. Leaves acute, 3 or 4 pairs: petals obtuse.
13. A. **lateriflora**, Linn. Leaves broader, obtuse: petals exserted. Or.

7. SAGINA, Linnæus.

1. S. **occidentalis**, Watson. Slender: 2-6 inches high: pedicels straight.
2. S. **Linnæi**, Presl. Densely matted: 1-2 in. high: fruiting pedicels curved.
3. S. **crassicaulis**, Watson. Stout, branched: leaves fleshy, scarious at base.

8. SPERGULA, Linnæus.

1. S. **arvensis**, L. Leaves filiform, smooth: sepals and petals equal.

9. LEPIGONUM, Fries.

1. L. **macrothecum**, F. & M. Pubescent: sepals and petals 3 lines long or more.
2. L. **medium**, Fries. More slender: flowers smaller, white.
3. L. **gracile**, Watson. Annual, smooth, slender: sepals ½-1 line long.

10. POLYCARPON, Linnæus.

1. P. **depressum**. Nutt. An inch high: petals included, entire.

11. LŒFLINGIA, Linnæus.

1. **L. squarrosa,** Nutt. Glandular-pubescent: 2-6 inches high.

ILLECEBRACEÆ.

PENTACÆNA, Bartling.

1. **P. ramosissima,** H. & A. Prostrate: subulate pungent gray-green leaves crowded: stipules silvery: sessile flowers clustered: sepals 5, hooded, ending in a spine.

PORTULACACEÆ.

* *Sepals 2, united below and adherent to the partly inferior ovary.*

Flowers yellow or rose-red: capsule opening by a lid.................................... 1

* * *Sepals 2, persistent, not adherent to the superior ovary.*

Style 3-cleft (rarely 2-cleft in Calandrinia): sepals green.

Stamens more than 6: petals 5 or more.................................... 2

Stamens 5 (3 in No. 8): petals 5.................................... 3

Stamens 3: petals 5, unequal, coherent: leaves or leaf and bract opposite.............. 4

Style 2-cleft: sepals membranous rounded-cordate exceeding the 2 or 4 petals......... 5

* * * *Sepals 4 to 8, distinct, unequal, persistent*.................................... 6

1. PORTULACA, Tournefort.

1. **P. oleracea,** L. Leaves obovate to spatulate: petals yellow, 1 to 2 lines. Nat.

2. **P. pilosa,** L. Leaves linear: nearly terete: petals red, 2 or 3 lines long.

2. CALANDRINIA, HBK.

Leafy stems, annual: flowers in racemes: petals 3 to 5, rose-red.................. 1, 2

Leaves mostly all radical: perennial: sepals orbicular.

Leaves linear, all radical: short scape 2-bracteate. Alpine....................... 3, 4

Leaves oblanceolate to obovate, all radical (except No. 5)...................... 5, 6, 7

1. **C. Menziesii.** Hooker. Sepals keeled, acute: capsule ovoid, acute.

2. **C. Breweri,** Watson. Capsule longer, conical, obtuse on deflexed pedicels.

3. **C. pygmæa,** Gray. Bracts scarious: sepals dentate: petals red.

4. **C. Nevadensis,** Gr. Larger: bracts green: sepals entire: petals white.

5. **C. oppositifolia,** Watson. Stem with 2 or 3 pairs of opposite leaves: petals white.

6. **C. cotyledon,** Wat. Scape with lanceolate ciliate bracts: petals rose-red.

7. **C. Leana,** Porter. Similar: petals 6 to 8. N. Cal. Or.

3. CLAYTONIA, Linnæus.

a. **Annuals with fibrous roots, rarely with bulblets.**

Stems simple, bearing a single pair of united or distinct leaves.

Leaves united into a cup enclosing the raceme.. 1
Leaves united at the base on one or both sides.. 2, 3
Leaves distinct (No. 4 with bulblets at base)............................ 2, 3, 4, 5, 11, 13

Stems usually branching, leafy.

Leaves opposite stems often rooting at joints and bulbiferous......................... 6
Leaves alternate... 7, 8, 9, 10

b. Perennials, with deep-seated tubers, stem leaves, a pair or a whorl.. 11, 12, 13

1. C. **perfoliata**, Donn. From 1 to 12 inches high: radical leaves broad.
Var. **parviflora**, Torr. Radical leaves all linear or spatulate.
2. C. **spathulata**, Dougl. Very slender: leaves distinct or united on one side.
3. C. **exigua**, T. & G. Glaucous: leaves nearly filiform; the pair broader, united at base.
4. C. **bulbifera**, Gr. Stems lax: long pedicels with conspicuous bracts.
5. C. **cordifolia**, Watson. Pair of leaves ovate, acute; radical, cordate: no bracts.
6. C. **Chamissonis**, Esch. Leaves oblanceolate: petals white.
7. C. **parviflora**, Mocino. Very slender: leaves broadly spatulate, small.
8. C. **dichotoma**, Nutt. Small: leaves linear: petals unequal: stamens 3.
9. C. **linearis**, Dougl. Leaves slender, clasping: sepals broad, often colored: petals white.
10. C. **diffusa**, Nutt. Leaves ovate or deltoid, petioled: racemes often axillary.
11. C. **Caroliniana**, Michx., var. **sessilifolia**, Torr. Usually one radical leaf; the pair lanceolate to linear: a single scarious bract.
12. C. **triphylla**, Watson. Leaves slender: raceme compound, bracts scarious.
13. C. **Nevadensis**, Watson. Leaves ovate to orbicular: petals 3-5 lines long, clawed.

4. MONTIA, Linnæus.

1. M. **fontana**, L. Stems weak, often matted: flowers minute: capsule globose.
2. M. **Howellii**, Watson. Leaves opposite the scarious triangular bracts of racemes.

5. CALYPTRIDIUM, Nuttall.

1. C. **umbellatum**, Greene. Umbel capitate: petals 4: stamens 3: style exserted. This plant is *Spraguea umbellata*, Torr.
2. C. **quadripetalum**, Watson. Petals 4: stamen 1: stigmas nearly sessile.
3. C. **roseum**, Watson. Petals 2, much shorter than the unequal sepals.
4. C. **monandrum**, Nutt. Petals 2, equalling the sepals, a line long or less.

6. LEWISIA, Pursh.

1. L. rediviva, Pursh. Scapes with a whorl of scarious bracts.
2. L. brachycalyx, Engelm. Scapes 2-bracted at base: sepals 4.

ELATINACEÆ.

Small prostrate aquatics with entire leaves: parts of the flower each 2 to 4 (except in sp. No. 3). Sepals obtuse: membranaceous.................................. 1

Erect, glandular-pubescent: parts of the flower in 5's.................................. 2

ELATINE, Linnæus.

1. E. Americana, Arnott. Seeds pitted in 9 to 10 lines, ¼ line long.
2. E. brachysperma, Gray. Seeds pitted in 6 or 7 lines, shorter.
3. E. Californica. Flowers not sessile: seeds much curved: stamens 6 to 8.

BERGIA, Linnæus.

1. B. Texana, Seubert. Leaves serrulate: flowers fascicled.

HYPERICACEÆ.

HYPERICUM, Linnæus.

Stamens very numerous: styles 3, long.................................. 1, 2

Stamens 15 to 20: styles 3, short: petals included.................................. 3

1. H. formosum, HBK. var. Scouleri, Coulter. Flowers 6 lines broad. Wet ground.
2. H. concinnum, Benth. Leaves acute: flowers an inch broad. Dry ground.
3. H. anagalloides, C. & S. Leaves 2-6 lines long: flowers 3-4 lines broad. Wet ground.

MALVACEÆ.

Column of stamens bearing anthers at the top: carpels in a ring around the axis.

Calyx-bracts 2 or 3, united below: an evergreen ever-blooming shrub.................. 1

Calyx-bracts 3, distinct: flowers axillary, pinkish: leaves 5-7-lobed.................. 2

Calyx-bracts none: flowers racemose or spicate.................................. 3

Calyx-bracts 1 to 3 or none: densely tomentose (except in sp. 6 & 7).................. 4

Calyx-bracts 1 or 2, slender: leaves 1-sided: flowers yellowish.................. 5

Column of stamens naked at top, 5-toothed: carpels forming a many-seeded capsule.

Calyx-bracts many.................................. 6

1. LAVATERA, Linnæus.

L. assurgentiflora, Kellogg. Showy flowers in axillary clusters.

2. MALVA, Linn.

M. rotundifolia and **M. borealis** are introduced weeds.

3. SIDALCEA, Gray.

* *Perennials with usually clustered stems decumbent at base.*

Raceme loose: no stellate hairs: rose-purple petals an inch long........................ 1
Raceme spicate: simple and stellate hairs: petals notched, pinkish, 6 lines long........ 2
Like No. 2, but the larger flowers deep lilac-purple.................................... 3
Stems branching: calyx globose in fruit: carpels smooth, straight...................... 4
Nearly glabrous, glaucous, pale, decumbent: petals obtuse or truncate.................. 5
Stellate pubescence short: large leaves dark green, slightly 5-lobed.................... 6

* * *Annuals with erect branching stems.*

Carpels strongly incurved and sharply rugose on back................................... 7
Carpels not incurved or rugose, conspicuously hairy-beaked............................. 8
Carpels several—nerved along the back: calyx-lobes abruptly acuminate.............. 9
Pedicels subtended by 5-7-parted hispid bracts: calyx-lobes slender.................10
Large, with cordate, 3-7-angled leaves: white flowers in close clusters:...............11

1. S. **malvæflora**, Gr. (S. **humilis**, Gr. of Cal. Bot., etc.) Common coast species.
2. S. **spicata**, Greene. Carpels small, hairy, not reticulaled. Sierra Nevada.
3. S. **campestris**, Greene. Stems bristly with deflexed hairs: calyx stellate-hairy.
4. S. **Oregana**, Gr. Glabrous below, 1 to 5 ft. high: corolla 6 lines long or more.
5. S. **glaucesens**, Greene. Calyx lobes very slender. High Sierras.
6. S. **asprella**, Greene. Decumbent, leaves shaped alike. Foot Hills, Sierras.
7. S. **Hartwegi**, Gr. Glabrous except the hispid calyx and pedicels. Sac. Val.
8. S. **hirsuta**, Gr. Stout and tall, branching: flower-clusters dense. Chico, Cal.
9. S. **calycosa**, Jones. Corolla small, light purple: calyx long-ciliate. Cent. Cal.
10. S. **diploscypha**, Gr. Hirsute: flowers large, umbellate clustered. Cent. Cal.

Var. **minor**, Gr. Flowers racemose: petals with a spot at base. Cent. Cal.

11. S. **malachroides**, Gr. Petals obcordate: carpels smooth. Redwoods, Cal. Coast.

4. MALVASTRUM, Gray.

Perennial, often shrubby: stems hoary or gray with soft pubescence............ 1 to 5
Perennial: densely stellate-hairy or hispid: dense-flowered........................... 6
Annual erect with spreading hairs: leaves reniform, long petioled..................... 7
Annual, decumbent: small leaves 5-lobed: flowers mostly solitary...................... 8

1. M. **Thurberi**, Gr. Shrubby, branches slender: spikes naked: flowers small.

2. **M. Fremonti**, Torr. Similar: calyx globose in fruit, very woolly.
3. **M. splendidum**, Kellogg. Tall shrub: flowers in large panicles, rose-red. S. Cal.
4. **M. marrubioides**, D. & H. Low: leaves serrate, thick: calyx-lobes slender. C. Cal.
5. **M. Palmeri**, Watson. Densely stellate-pubescent: large flowers yellowish.
6. **M. densiflorum**, Watson. Hispid bracts very long: calyx-lobes long attenuate.
7. **M. rotundifolium**, Gr. Low: petals 6 lines long, a red spot at the base. S. Cal.
8. **M. exile**, Gr. Pedicels slender: petals obovate, 2 to 5 lines long. S. Cal.

5. SIDA, Linnæus.

1. **S. hederacea**, Torr. Decumbent: leaves 1-sided: petals yellowish.

6. HIBISCUS, Linnæus.

1. **Californicus**, Kellogg. Flowers axillary, white with purple, large.

STERCULIACEÆ.

FREMONTIA, Torrey.

1. **F. Californica**, Torr. Tall shrub: flowers yellow, axillary, apetalous. S. N. Mts.

LINACEÆ.

LINUM, Linnæus.

Styles 2: flowers yellow: leaves opposite, glabrous, oblong........................ 1
Styles 3: flower yellow: leaves alternate.. 2, 3
Styles 3: flowers white to rose-color: leaves alternate (or whorled in 7).
  Petals with 3-parted or 3-lobed appendage at base.......................... 5, 6, 7
  Petals 2-toothed at base, scarcely longer than the sepals........................ 8
Styles 5: flowers large, blue: leaves alternate.................................. 9, 10

1. **L. digynum**, Gr. Sepals denticulate, a line long. Near Yosemite Valley. N. Cal.
2. **L. Breweri**, Gr. Glaucous: leaves small, very slender, basal glands large.
3. **L. adenophyllum**, Gr. Leaves margined with stipitate glands. Cent. Cal.
4. **L. Californicum**, Benth. Glaucous: petals 4 lines long: capsule acute.
5. **L. congestum**, Gr. Calyx pubescent: flowers in close clusters. S. F. Bay.
6. **L. spergulinum**, Gr. No stipular glands: petals 2-3 lines long. S. F. Bay.
7. **L. drymarioides**, Curran. Pubescent: leaves ovate, margins glandular. C. Cal.
8. **L. micranthum**, Gr. Flowers minute: capsule exserted. Mts. Cal.
9. **L. perenne**, Linn. Perennial, glaucous: flowers large, blue.
10. **L. usatissimum**, L. Similar but annual. The common cultivated flax.

Lakeport
June
'93

GERANIACEÆ.

Carpels 5, 1-seeded, separating with styles when ripe from the long axis.
Fertile stamens 10: tails of carpels coiled, not bearded.................... 1
Fertile stamens 5: tails of carpels twisted, bearded.......................... 2
Carpels 5, 1-seeded, fleshy, globular: stamens 10.................................. 3
Carpels united into a 5-celled ovary: capsule 5-sided............................ 4

1. GERANIUM, Linnæus.

1. G. **Carolinianum, L.** Petals 2 or 3 lines long. A common weed.
2. G. **incisum, Nutt.** Flowers deep rose-purple, an inch broad.

2. ERODIUM, L'Heritier.

1. E. **cicutarium, L'H.** Pinnate leaves: leaflets pinnatifid. ("Filaree.")
2. E. **moschatum, L'H.** Leaflets doubly toothed: musky.
3. E. **Botrys,** Bertoloni. Leaves oblong, pinnatifidly lobed. Cent. Cal.
4. E. **macrophyllum, H. & A.** Leaves palmately lobed. Cent. & S. Cal.

3. LIMNANTHES, Robt. Brown.

1. L. **Douglasii,** R. Br. Glabrous: petals yellow, white tipped. Cal.
2. L. **rosea,** Hartweg. Glabrous: petals purple tinged, obovate. Sac. Val.
3. L. **alba,** Hartweg. Pubescent: petals white or nearly so. Cal.

4. OXALIS, Linnæus.

1. O. **Oregana,** Nutt. Flowers pinkish. In coast forests.
2. O. **trilliifolia,** Hook. In Oregon (?).
3. O. **corniculata, L.** Slender branching stems: flowers yellow.

RUTACEÆ.

A tall shrub or tree: leaves 3-foliolate: flowers in terminal clusters.................... 1
A low shrub: leaves simple, opposite: flowers axillary...................................... 2

1. PTELEA, Linnæus.

1. P. **augustifolia,** Benth. Fruit broadly winged, orbicular. Cent. Cal.

2. CNEORIDIUM, Hook. f.

1. C. **dumosum,** H. f. Leaves often fascicled: fruit drupe-like. San Diego.

CELASTRACEÆ.

A slender deciduous shrub with 4-angled branches: leaves 2-4 inches long............ 1
A low much-branched evergreen: leaves 6-18 lines long, numerous.................. 2

1. EUONYMUS, Tournefort.

1. E. **occidentalis**, Tourn. Flowers dark brown, parts in 5's, rotate, drooping.

2. PACHYSTIMA, Rafinesque.

1. P. **Mersinites**, Raf. Flowers greenish, parts in 4's, about a line broad.

RHAMNACEÆ.

Flowers greenish. Leaves alternate: flexuose branches spiny........................ 1
Leaves alternate: not spiny: fruit juicy........................ 2
Leaves opposite, 1 or 2 lines long: fruit dry.................... 3
Flowers white or blue, in dense clusters: fruit dry................................. 4

1. ZIZYPHUS, Jussieu.

1. Z. **Parryi**, Torr. Peduncles axillary, recurved in fruit, 1-3-flowered.

2. RHAMNUS, Linnæus.

Flowers apetalous and mostly diœcious: seeds concave........................ 1, 2
Flowers with minute petals, mostly perfect: seeds convex on the back............. 3, 4
1. R. **alnifolia**, L'Her. Low: deciduous leaves acute at each end, serrate.
2. R. **crocea**, Nutt. Leaves acutely denticulate, evergreen, thin.
3. R. **Californica**, Esch. Leaves elliptical to ovate-oblong, evergreen, thick.
Var. **tomentella**, Gr. Densely white-tomentose. Both forms common in Cal.
4. R. **Purshiana**, DC. Elliptical leaves 2 to 7 inches long, deciduous.

3. ADOLPHIA, Meisner.

1. A. **Californica**, Watson. In dense clumps 2 or 3 ft. high, branchlets spiny.

4. CEANOTHUS, Linnæus.

§ 1. Leaves all alternate: fruit not crested.
Leaves 3-nerved from the base.
Branches not rigid or spiny: leaves glandular serrate (except No. 1).
Flowers white in large clusters.. 1, 2, 3
Flowers blue.. 4, 5, 6

Branches rigid, spreading, often spinose: racemes simple.
Leaves glandular-serrate: flowers blue.............................. 7, 8
Leaves usually entire: branches grayish......................... 9, 10, 11
Leaves pinnately veined, obtuse: flowers blue (see No. 5)............ 12, 13, 14, 15

§ 2. Leaves small, often opposite, very thick with numerous straight side veins, spinosely toothed or entire: stipules mostly large and warty: flowers in sessile or shortly peduncled axillary clusters: fruit with 3 projections: branches rigid........... 16 to 20

1. C. **integerrimus**, H. & A. Slender branches round: leaves thin.
2. C. **velutinus**, Dougl. Stout: leaves thick, resinous above.
3. C. **sanguineus**, Pursh. Branches reddish: leaves thin; petioles slender.
4. C. **thyrsiflorus**, Esch. Branches angled: leaves shining above, ashy beneath.
5. C. **dentatus**, T. & G. Leaves mostly 3-4 lines long, thin: thyrse globose.
6. C. **decumbens**, Watson. Trailing, hirsute: leaves thin, teeth green-glandular.
7. C. **hirsutus**, Nutt. Silky, rarely spiny: leaves rounded or cordate at base, acute.
8. C. **serediatus**, H. & A. Leaves smooth above: racemes pubescent, peduncles short.
9. C. **divaricatus**, Nutt. Branches sometimes green: racemes 1-4 inches long.
10. C. **incanus**, T. & G. Leaves hoary beneath: racemes short: fruit warty.
11. C. **cordulatus**, Kell. Pubescent, low, flat-topped: racemes an inch long or less.
12. C. **spinosus**, Nutt. Often a tree: leaves entire, oblong, thick; petioles slender.
13. C. **papillosus**, T. &. G. Leaves narrow, dark green, shining and pimply above.
14. C. **floribundus**, Hooker. Leaves 3-4 lines long, acute, undulate, denticulate.
15. C. **Veitchianus**, Hooker. Glabrous, leaves thick, obovate-cuneate. Rare.
16. C. **crassifolius**, Torr. Branches hoary: leaves tomentose beneath. Cal. Coast.
17. C. **cuneatus**, Nutt. Bark ashy gray: leaves cuneate-obovate, entire. Common.
18. C. **macrocarpus**, Nutt. Tree-like, 8 to 12 ft. high: fruit very large. St. Barbara.
19. C. **rigidus**, Nutt. Branchlets tomentose: leaves 2 to 5 lines long: flowers blue.
20. C. **prostratus**, Benth. Prostrate: leaves spinose at apex only: flowers blue.

VITACEÆ.

VITIS, Tournefort.

1. V. **Californica**, Benth. Leaves round-cordate, serrate. (Wild Grape.)

SAPINDACEÆ.

Flowers in large terminal erect thyrses: calyx tubular: clawed petals unequal......... 1
Flowers small, the fertile ones in drooping clusters: ovary 2-lobed: fruit 2-winged.
Leaves palmately lobed.. 2

Leaves pinnately 3-foliolate.. 3
Flowers in drooping racemes: stamens 5, much exserted: leaves 3-foliolate, serrulate... 4

1. ÆSCULUS, Linnæus.

1. **Æ. Californicus**, Nutt. Leaves palmately 4-7-foliolate. (Buckeye.)

2. ACER, Tournefort.

1. **A. macrophyllum**, Pursh. Yellowish flowers in dense racemes: fruit hairy.
2. **A. circinatum**, Pursh. Corymbs 10-20 flowered: sepals red or purplish.
3. **A. glabrum**, Torr. Sepals and petals greenish yellow: filaments naked.

3. NEGUNDO, Mœnch.

1. **N. Californicum**, T. & G. Calyx minute: petals none, diœcious. (Box-Elder.)

4. STAPHYLEA, Linnæus.

2. **S. Bolanderi**, Gr. Leaflets broad, stipellate: fruit bladdery. Shasta.

ANACARDIACEÆ.

RHUS, Linnæus.

Slender deciduous shrubs: leaves 3-foliolate: fruit compressed globose.
  Flowers in dense axillary panicles: fruit smooth, dry, whitish.................... 1
  Flowers in short scaly-bracted spikes: fruit hairy, gummy, scarlet.............. 2
Stout, diffuse evergreen shrubs: leaves simple, coriaceous: fruit ovoid.
  Flowers rose-color: leaves ovate on short petioles.............................. 3
  Flowers yellowish: leaves lanceolate on slender petioles........................ 4

1. **R. diversiloba**, T. & Gr. Stems erect or climbing by rootlets (Poison Oak).
2. **R. aromatica**, Ait. **var. trilobata**, Gr. Diffusely slender-branched.
3. **R. integrifolia**, B. & H Leaves entire or spinosely-toothed: fruit red, frosty.
4. **R. laurina**, Nutt. Leaves glaucous, entire: panicles 2-4 inches long.

LEGUMINOSÆ.

§ 1. Stamens distinct: shrubs (except No. 1).
Leaves palmately 3-foliolate: yellow flowers in terminal close racemes................ 1
Stiff, much branched, evergreen: flowers red-purple, solitary, axillary.................. 2
Leaves pinnate: flowers purple in dense axillary spikes: petal 1......................... 9

Leaves simple, entire, cordate: flowers rose-purple in axillary clusters.................14

§ 2. Stamens all united or one above distinct: herbs (except some in 3 & 7).

** Leaves palmate with more than 3 leaflets: flowers in heads or racemes.*

Leaflets entire. Spikes or racemes terminal: anthers of 2 kinds...................3
Yellow flowers 1 to 5 with a bract....................Sp. No. 10 in 7
Purplish flowers: stipules not adnate, deciduous...................8
Leaflets toothed or entire: stipules adnate: anthers alike....................§ 1 in 4

** * Leaves 3-foliolate, palmate or pinnate.*

Leaves palmate: flowers in heads or short spikes: corolla persistent...................4
Leaves pinnate: flowers in axillary spikes or racemes.
Corolla yellow or white: pod wrinkled: leaves fragrant...................5
Corolla purple or greenish: leaflets entire: stipules free...................8
Corolla yellow or purple: leaflets toothed: pod curved or coiled...................6
Leaves pinnate. Flowers in small axillary clusters, yellow: pod spiral, prickly.......6
Flowers solitary or in wheel-like clusters, axillary...................7

** * * Leaves pinnately 4-many-foliolate with a terminal leaflet.*

Flowers solitary or in umbellate whorls, axillary...................7
Flowers in axillary spikes: pod prickly: leaves sticky...................10
Flowers in axillary spikes or heads: pod often inflated, often 2-celled...................11

** * * * Leaves pinnate, ending in a bristle, imperfect leaflet or a tendril.*

Style filiform, hairy around the apex...................12
Style flattened, usually twisted half around, one side hairy...................13

1. THERMOPSIS, Robt. Brown.

1. T. **Californica**, Watson. Short-woolly: pod 6-8-ovuled, stipe short.
2. T. **montana**, Nutt. Rather silky: leaflets smooth above: pod 10-12- seeded
3. T. **macrophylla**, H. & A. Villous: leaves oblong-elliptical acute: seeds 4 or 5.

2. PICKERINGIA, Nuttall.

1. P. **montana**, Nutt. Leaves 1-3-foliolate, numerous: stamens persistent.

3. LUPINUS, Linnæus.

A. *Perennials, more or less shrubby, leafy, silky: ovules 6 to 12*............... 1, 2, 3, 4

B. *Perennial herbs, mostly tall; flowers large; bracts deciduous: ovules 6 or more.*

Woody at base: silky: calyx-lips nearly equal...................1, 2, 3
Stems mostly stout and hollow: leaflets glabrous above...................5, 6
Stems slender, not erect: leaflets an inch long or less...................7
Stems leafy and branching: petioles and bracts short...................8, 9, 10

C. *Perennial herbs: flowers small: (Ex. No. 13): not yellow: ovules 3 to 6.*

Leaves distant, not glabrous above; lower petioles long: keel ciliate........... 11 to 16

Leafy: petioles and peduncles mostly short: bracts deciduous: ovules 3 to 5.. **17, 18, 19**

D. *Dwarf alpine perennials, mostly tufted: lower calyx-lip 3-toothed: keel ciliate: pod hairy, 3-4- seeded*.. **20 to 23**

E. *Annuals: leaflets mostly 5 to 7 (8 to 10 in No. 29): bracts falling with or before the petals: upper calyx-lip 2-parted or bifid: pod 4-8-seeded.*

Bracts deciduous: flowers in whorls, 5 or 6 lines long.......................... **24, 25**

2 or 3 lines long........................ **26 to 28**

Bracts deciduous or persistent for a while: flowers scattered.................. **29 to 35**

F. *Annuals: leaflets cuneate-oblong or obovate: bracts conspicuous, persistent in fruit: ovules and seeds 2*.. **36 to 38**

1. **L. arboreus**, Sims. A shrub: flowers yellow, rarely purplish, fragrant. Cal.
2. **L. Chamissonis**, Esch. A low shrub: flowers blue, rarely violet, pink or white.
3. **L. Douglasii**, Agardh. Woody at base: much like forms of the last. Cal.
4. **L. Ludovicianus**, Greene. Shrubby: very villous: flowers purple: pod 5-seeded.
5. **L. polyphyllus**, Lindl. Leaflets numerous, large: raceme purple, long.
6. **L. rivularis**, Dougl. Stipules very slender: leaflets 7 to 10: petioles short.
7. **L. littoralis**, Dougl. Leaflets 6 to 12 lines long: racemes short: ovules 10 to 12.
8. **L. Sabinii**, Dougl. Stipules long, setaceous: flowers bright yellow. Blue Mts.
9. **L. albicaulis**, Dougl. Reflexed margin of the acute standard coherent at apex.
10. **L. ornatus**, Dougl. Standard silky: keel ciliate: stipules setaceous: seeds white.
11. **L. sericeus**, Pursh. Bracts long: calyx densely silky, gibbous: pod densely hairy.
12. **L. leucophyllus**, Dougl. Densely silky: dense racemes sessile: standard hairy
13. **L. Grayi**, Watson. A span high: very hoary-tomentose: racemes short, loose.
14. **L. lepidus**, Dougl. Low, slender, silky: peduncle and raceme long: petals violet.
15. **L. confertus**, Kell. Similar but bracts persistent: corolla blue to rose.
16. **L. onustus**, Watson. Decumbent woody base: flowers deep blue, scattered.
17. **L. parviflorus**, Nutt. Stems slender, 2 or 3 ft. high, strict, glabrous above.
18. **L. Andersoni**, Watson. Appressed-pubescent, much branched: racemes short.
19. **L. laxiflorus**, Dougl. Silky: raceme slender: calyx saccate or spurred.
20. **L. aridus**, Dougl. Raceme dense, 2 or 3 inches long: peduncle short: petals purple.
21. **L. minimus**, Dougl. Similar, more silky: peduncles longer: standard broader.
22. **L. Breweri**, Gr. Stems from spreading woody base: densely silky: leaflets obovate.
23. **L. Lyallii**, Gr. Similar: petioles longer: standard narrower: petals violet. Or.
24. **L. affinis**, Agardh. A foot high: leaflets broadly obovate: bracts short. Cal.
25. **L. nanus**, Dougl. Slender: bracts long: petals broad, purple and white. Cal.
26. **L. micranthus**, Dougl. Slender, branched, decumbent, villous: racemes short.
27. **L. trifidus**, Torr. Similar: lower calyx-lip 3-cleft: pod 5-6-seeded. San F'co Bay.
28. **L. citrinus**, Kell. Similar: calyx-lip 3-toothed: flowers orange or yellow. Fresno.
29. **L. leptophyllus**, Benth. Bracts very long: standard with a crimson spot. Cal.
30. **L. sparsiflorus**, Benth. Similar: bracts short, persisting longer: petals violet.
31. **L. truncatus**, Nutt. Linear leaflets truncate or 3-toothed, smooth above: petals

purple. This and the last two in Cent. Cal., southward.

32. **L. Stiveri**, Kell. Leaflets broad: petioles short: standard yellow: wings rose.
33. **L. hirsutissimus**, Benth. Very hispid with viscid stinging hairs: petals purple.
34. **L. concinnus**, Agardh. Very villous: lower calyx-lip trifed: standard with yellow.
35. **L. gracilis**, Agardh. Leaflets broad, 3 to 6 lines long: petals 2 or 3 lines long, blue and white. Monterey, S. Rare.
36. **L. microcarpus**, Sims. Calyx very villous: flowers usually blue or purple.
37. **L. densiflorus**, Benth. Calyx only finely pubescent: flowers usually yellowish.
38. **L. luteolus**, Kell. Leaves scattered: petioles short: flowers pale yellow. Cal.

4. TRIFOLIUM, Linnæus.

Leaflets mostly 5 to 7	1 to 4
Leaflets 3: heads with no involucre.	
Flowers white or yellowish: leaflets linear to oblong	5, 6, 7, 12
Flowers red, 6 lines long or more	8, 9
Flowers small, at length reflexed	10, 11, 12, 14, 15, 16
Leaflets 3: heads with an involucre: peduncles axillary.	
Involucre green, rotate, the lobes laciniately toothed	17 to 20
Involucre with entire lobes	21, 25, 26
Involucre cup-shaped or broad, lobes toothed	22, 23, 24
Involucre very small or reduced to a ring	26

§ 1. *Leaflets 5 to 7, rarely 3: calyx teeth filiform, plumose. Alpine perennials.*

1. **T. megacephalum**, Nutt. Leaflets obovate or narrower, toothed; flowers spicate.
2. **T. Andersoni**, Gr. Densely silky: leaflets entire, acute: flowers umbellate.
3. **T. Lemmoni**, Watson. Leaflets coarsely serrate: flowers reflexed: ovules 2.
4. **T. Plummeræ**, Wat. Matted, hoary: leaflets 3 to 5, oblanceolate: ovary hairy.

§ 2. *Leaflets 3: heads not involucrate, terminal or apparently so, pedunculate: flowers sessile or nearly so (except No. 12): only No. 13 annual (its heads in one form sessile).*

5. **T. eriocephalum**, Nutt. Flowers in dense spikes, soon reflexed: ovary hairy.
6. **T. plumosum**, Dougl. Similar: flowers not reflexed; ovary smooth.
7. **T. longipes**, Nutt. Similar: ovoid heads smaller: nearly glabrous.
8. **T. altissimum**, Dougl. Leaflets very acute: 4 calyx teeth curved or twisted.
9. **T. Beckwithii**, Brewer. Leaflets broader: heads globose: calyx teeth straight.
10. **T. Kingii**, Watson. Leaflets acute: rachis produced: flowers rose-purple.
11. **T. Bolanderi**, Gr. Cespitose the short stems decumbent: ovary smooth, 2-ovuled.
12. **T. Breweri**, Watson. Very slender, diffuse: flowers few, nearly white, pediceled.
13. **T. Macræi**, H. & A. Erect slender, 6 to 12 inches high: heads ovoid: peduncles long, or, in var. **dichotomum**, Brewer, short. (?)

§ 3. *Leaflets 3: heads small, not involucrate, pedunculate, axillary: flowers on short, at length reflexed pedicels: glabrous annuals: ovules 2.*

14. **T. gracilentum**, T. & G. Flowers pale-rose to red-purple: calyx-teeth subulate.
15. **T. ciliatum**, Gr. Similar: calyx teeth scarious margined, ciliolate.
16. **T. bifidum**, Gr. Like 14 but smaller, the narrow leaflets bifid.

§ 4. *Leaflets 3: heads subtended by an involucre: peduncles axillary: flowers in whorls, sessile or nearly so: annuals.*

* *Involucre deeply many-cleft, laciniate: corolla not becoming inflated.*

17. **T. involucratum**, Willd. Leaflets mostly oblanceolate, acute.

Var. heterodon, Watson. Larger heads: leaflets broader: ovules same, mostly 5 or 6.

18. **T. tridentatum**, Lindl. Slender and erect: leaflets very narrow: ovules 2.

Var. obtusiflorum, Watson. Stout decumbent, glandular: leaflets broader.

Var. melanthum, Watson. Smooth, slender: heads of dark purple flowers small.

19. **T. pauciflorum**, Nutt. Slender, weak: heads few-flowered: calyx teeth long.
20. **T. monanthum**, Gr. Decumbent stems 1 to 4 inches long: heads 1 to 4-flowered.

* * *Involucre light green, often whitish-scarious at base, not deeply lobed, broad as the the head, and saucer-shaped or cup-like: corolla not becoming inflated, or moderately so in No. 24.*

21. **T. microcephalum**, Pursh. Soft hairy: involucre about 9-lobed, lobes entire.
22. **T. microdon**, H. & A. Involucral lobes 3-toothed: calyx-teeth scarious-serrulate.
23. **T. cyathiferum**, Lindl. Smooth: bristly-branched calyx-teeth equaling the corolla. Eel Riv. and Sierra Val. to the Columbia Riv.
24. **T. barbigerum**, Torr. Mostly less than a span high: calyx teeth bristly, long.

Var. Adrewsii, Gr. Stouter, more hairy: plumose calyx teeth very long.

* * * *Involucre rotate, lobes entire or wanting: corolla inflated in fruit.*

25. **T. fucatum**, Lindl. Yellowish or white flowers often reddish tinged, large.
26. **T. depauperatum**, Desvaux. Slender: flowers small: involucre often a ring.

Var. amplectans has a larger 4-5-parted involucre. Heads in both forms small.

5. MELILOTUS, Tournefort.

1. **M. parviflora**, Desf. Flowers yellow a line long: spikes slender. (Sweet Clover.)
2. **M. officinalis**, Willd. Similar flowers 2 lines long on slender pedicels.
3. **M. alba**, Lam. Flowers white. All introduced from Eu. The first common.

6. MEDICAGO, Linnæus.

1. **M. sativa**, L. Flowers blue-purple in close nearly capitate racemes. (Alfalfa.)
2. **M. denticulata**, Willd. Flowers yellow: pod globose-coiled, prickly. (Bur Clover.)
3. **M. maculata**, Willd. Similar: leaflets with a dark spot. All introduced from Eu.

7. HOSACKIA, Douglas.

Flowers solitary or rarely 2 in the axils: no stipules.

Peduncle bracteate or rarely naked .... **9 to 18**

Peduncle none or very short.. 14, 15

Flowers in pedunculate umbels or whorls.

Peduncle with a compound or simple bract.

Bract below the top of the peduncle: stipules large.................. 1, 2, 3

Bract at the top of the peduncle.

Stipulate leaves smooth.................................... 4, 5

Stipulate leaves pubescent....................... 1, 6, 7, 8

Stipules none. Pod with 5 or more seeds............ 8 to 12

Pod 1-2-seeded........... 17, 19, 22 to 25

Peduncle not bracteate. Stout, erect: pod more than 5-seeded.................. 4

Slendor, prostrate: pod 1-2-seeded................ 19, 20

Flowers in nearly or quite sessile umbellate clusters: pod 1-2-seeded.

Nearly smooth, somewhat woody.................... 16, 18

Very pubescent (silky or tomentose).......... 21, 23, 24, 25

§ 1. *Pod linear, straight or nearly so, 5-20-seeded (2-4- seeded in 15) glabrous or nearly so (except in 10 and 16).*

* *Leaves with stipules, leaflets 5 to 20: umbels pedunculate: flowers 6 lines long or longer: keel obtuse: erect perennials.*

† *Flowers dull-colored, yellowish and purple.*

1. **H. incana,** Torr. Low, stout, densely silky: peduncles about 6 lines long.
2. **H. stipularis,** Benth. Taller, villous, glandular: peduncles longer.
3. **H. crassifolia,** Benth. Erect, tall, nearly or quite glabrous: peduncles long.

† † *Flowers rather showy, larger.*

4. **H. bicolor,** Dougl. Glabrous: flowers yellow with whitish wings.
5. **H. gracilis,** Benth. Similar: larger flowers with purplish wings.
6. **H. oblongifolia,** Benth. Flowers yellow and purple, standard orange.

Var. angustifolia, Watson. A span high: leaflets narrow: umbels 1-5-flowered.

7. **H. Torreyi,** Gr. Silky: standard yellow, wings and keel white.
8. **H. macrantha,** Greene. Stipules deciduous: petals yellow standard 6 lines broad.

* * *Stipules reduced to dark, often minute, glands (see No. 8): leaflets 3 to 9 (1 to 3 in No. 14): claws of petals not exserted.*

† *Peduncles long, 1-8-flowered: flowers exceeding 5 lines long: perennials: more or less appressed silky: leaflets obovate or narrower, rather acute.*

9. **H. grandiflora,** Benth. Flowers yellowish or greenish white, rarely purple.
10. **H. rigida,** Benth. Petioles short or none: flowers yellow, becoming brown.

† † *Peduncles 1-5-flowered, about equaling the leaves: flowers less than 6 lines long: yellow in 11, 12; pinkish in 13, 14.*

11. **H. maritima,** Nutt. Leaflets fleshy, 4 to 6 lines long, obovate or narrower.
12. **H. strigosa,** Nutt. Diffuse, strigose: leaflets linear, rarely ovate, small.
13. **H. parviflora,** Benth. Very slender: flowers 2 or 3 lines long, rarely yellow.
14. **H. Purshiana,** Benth. Widely branching, silky: flowering July to October.

† † † *Flowers nearly sessile and mostly solitary, not bracteate (see 12): leaves with a broad rachis which bears 3 to 5 leaflets at the end and one side.*

15. **H. subpinnata**, T. & G. Much branched, usually decumbent or ascending and a few inches high: flowers yellow. Very common in Central Cal.

Var. major. Erect, corymbosely branched above, 6 inches to 3 ft. high, flowers pinkish. Northern Cal. to Washington.

16. **H. brachycarpa**, Benth. Soft-hairy: flowers yellow: hairy pod 2-4-seeded.

§ 2. *Pod with a long slender incurved beak, 1-2-seeded: claw of the standard remote from the rest: umbels sessile or on short peduncles (except Nos. 18, 20): flowers less than 6 lines long: stipules minute dark colored glands: leaflets 3 to 7.*

* *Nearly glabrous: slender stems virgately branched: pod only slightly pubescent, 2-seeded.*

† *Somewhat woody at the base: stems angled: leaflets mostly 3.*

17. **H. glabra**, Torr. Stems very many erect or decumbent: leaves and fl's crowded.
18. **H. cytisoides**, Benth. Similar: peduncles with a bract: calyx-teeth often recurved.
19. **H. juncea**, Benth. Leaflets broader: some of the flowers pedunculate.

† † *Not woody: stems terete: leaflets usually 5 to 7, and 2 or 3 lines long.*

20. **H. prostrata**, Nutt. Leaflets obovate, acute: flowers 2 or 3 lines long.
21. **H. micrantha**, Nutt. Flowers smaller: peduncle naked: style hairy.

* * *Very silky or tomentose; herbaceous stems terete: pod hairy: mostly 1-seeded: leaflets 5 to 7 (usually 3 in 22).*

22. **H. sericea**, Benth. Densely white-silky: umbels loosely few-flowered.
23. **H. argophylla**, Gr. Umbels 6-10-flowered: flowers orange or yellow. Sierras.
24. **H. decumbens**, Benth. Villous and tomentose: stems diffuse: lvs and fls crowded.
25. **H. tomentosa**, H. & A. Very tomentose, prostrate: flowers 3 or 4 lines long.
26. **H. Heermannii**, D. & H. Less tomentose more branched: leaflets and fl's smaller.

8. PSORALEA, Linnæus.

Leaflets 3, orbicular on long petioles from creeping stem	1
Leaflets 3, rombic-ovate to narrowly ovate: stems erect	2, 3, 4
Leaflets 5, rarely 7: clustered stems very short	5

1. **P. obicularis**, Lindl. Peduncles a foot or two long. In wet ground. Cal.
2. **P. strobilina**, H. & A. Stems 2-3 ft. high: peduncles shorter than the leaves. Cal.
3. **P. macrostachya**, DC. Often 6 ft. high or more: peduncles exceeding the leaves.
4. **P. physodes**, Dougl. Stems numerous, 1 or 2 ft. high: flowers greenish. Coast.
5. **P. Californica**, Watson. Silky-gray: leaves exceeding the close racemes. Rare.

9. AMORPHA, Linnæus.

1. **A. Californica**, Nutt. Glandular, 3 to 10 ft. high: standard exceed by stamens.

10. GLYCYRRHIZA, Linnæus.

1. **G. lepidota**, Nutt. **var. glutinosa**, Watson. Flowers white or pinkish, 6 lines long.

11. ASTRAGALUS, Tournefort.

* *Annuals: pods 2-celled.*

Pods 1 or 2 lines long, 2-seeded, wrinkled: spikes short.......................... 1, 2
Pod linear, straight, 5 to many seeds: flowers capitate.......................... 3, 4
Pods 3 to 5 lines long: spikes of small white flowers very long........................ 5
Pods ovoid, long-beaked, gray-silky: flowers capitate, white........................ 6

* * *Perennials: pods 1-celled, with thin walls, inflated, bladder-like.*

Pods on stipes equaling or little exceeding the calyx.......................... 7, 8, 9
Pods on filiform, stipes much exceeding the calyx: stem erect............. 10, 11, 12
Pods sessile in the calyx, 1-2 inches long: many seeds...................... 13 to 17
5 to 8 lines long: stems low: flowers 3 lines long...... 18, 19

* * * *Perennials: pods turgid, not bladder-like, coriaceous, densely long-woolly or downy, incurved*.. 20, 21, 22

* * * * *Perennials: pods often turgid, not bladder-like, not long-hairy or woolly.*

Pods stipitate, 1-celled, sutures not inflexed..... .... 23 to 26
2-celled: cross section obcordately 2-lobed......................... 27
Pods not stipitate, 1 or 2 inches long, 1-celled........... .... 28, 29
2 or 3 lines long, 2-celled................................ 30
2 lines long, hoary, cylindric-oval.......................... 31
3 lines long, 1-celled: leaflets spiny-tipped.................... 32

1. A. **didymocarpus**, H. & A. Calyx equaling the erect pod, black-hairy.
2. A. **nigrescens**, Nutt. Calyx ⅓ as long as the pendulous lightly wrinkled pods.
3. A. **tener**, Gr. Violet and white flowers: pods 5-7 lines long, drooping.
4. A. **Rattani**, Gr. Flowers larger, violet: pods slender, 1-1½ inches long, erect.
5. A. **Clevelandii**, Greene. Tall: leaflets ⅓-¾ in. long, mucronate.
6. A. **Breweri**, Gr. Similar in habit to No. 4: pods 3-4 lines long, beaks longer.
7. A. **Hookerianus**, Dietr. Diffuse, silky, a span high: pod obovoid, obtuse.
8. A. **oxyphysus**, Gr. Erect, 2 or 3 ft. high, silky: pod slender-obovoid, acuminate.
9. A. **curtipes**, Gr. Lower, not silky: stipules united: pod ovoid or oval, acute.
10. A. **leucophyllus**, T. & G. Oval pod one-sided, filiform hairy stipe very long.
11. A. **leucopsis**, T. & G. Similar pod tapering into a smooth stipe half as long.
12. A. **trichopodus**, Gr. Pods smaller, 6 lines long or more, stipe 3 lines long.
13. A. **oocarpus**, Gr. Straggling stems 3-6 ft. long: green stipules mostly deflexed.
14. A. **Crotalariæ**, Gr. Scarious stipules distinct: ovoid pod 1-1½ inches long.
15. A. **Menziesii**, Gr. Similar: upper stipules united: pod larger, more bladdery.
16. A. **macrodon**, Gr. Like the preceding: flowers smaller: peduncles short.
17. A. **Douglasii**, Gr. Spike an inch long or less: pod ovoid 1½-2 inches long.
18. A. **Hornii**, Gr. Pods in a dense head or short spike, ovoid, acuminate, hairy.
19. A. **Pulsiferæ**, Gr. White-hairy: pods few ovoid, curved, 3-8-seeded. hairy.
20. A. **Purshii**, Dougl. Tufted, silky: peduncles 5-6-flowered: pod ovoid.

21. A. **Andersoni**, Gr. Densely white-hairy: leaflets 13-25 pairs: pods falcate.
22. A. **Congdoni**, Watson. Less hairy: leaflets 8-10 pairs: pod narrower.
23. A. **Gibbsii**, Kellogg. Soft-hairy: pod much curved, an inch or more long.
24. A. **collinus**, Dougl. Hoary: pod slightly curved, erect, less than 1 inch long.
25. A. **Californicus**, Greene. Stouter: pod straight, purple-bloched, 1½ inches long.
26. A. **Antiselli**, Gr. Ashy-hairy; leaflets 21-29: straight pod, 8-9 lines long.
27. A. **Bolanderi**, Gr. Scarious stipules united: pod ovoid, curved, veiny.
28. A. **Webberi**, Gr. Silvery-silky: pods thick-walled, glabrous, sutures prominent.
29. A. **pychnostachyus**, Gr. Stout, hoary: pods reticulated, thin-walled, acute.
30. A. **Lemmoni**, Gr. Slender, procumbent, green: leaflets 9-11, mucronate.
31. A. **Austinæ**, Gr. Tufted, silvery-silky: flowers in a close head, whitish.
32. A. **Kentrophyta**, Gr. Flowers 1-3 on very short peduncles, 2 lines long.

12. VICIA, Tournefort.

Perennials: peduncles 4-18-flowered.. **1, 2**
Annuals: peduncles short, 1-2-flowered.. **3, 4**

1. V. **gigantea**, Hooker. Stout, 5-10 ft. high: petals dull-purplish.
2. V. **Americana**, Muhl. Glabrous, 1-4 ft. high: leaflets 8-16, variable.

Var. truncata, Brewer. Leaflets truncate or toothed at apex, somewhat hairy.
Var. linearis, Watson. Leaflets linear: mostly low and slender.

3. V. **exigua**, Nutt. Mostly low: leaflets about 8: flowers 3 lines long, purplish.
4. V. **sativa**, Linn. Stouter: flowers nearly sessile, 1 inch long, violet.

13. LATHYRUS, Linnæus.

Leaves with tendrils: racemes several—many-flowered.

Pod not on a stipe. Stipules large: glabrous.. **1, 2, 3**
Stipules narrow: more or less pubescent.. **7, 8**
Pod on a short stipe. Stems stout, tall.. **4, 5, 6**
Leaves without tendrils, or rarely with them: pods on short stipes......... **9, 10, 11**

1. L. **maritimus**, Bigelow. Leaflets 3-5 pairs, close flowers purple.
2. L. **polyphyllus**, Nutt. Similar: leaflets 6-10 pairs, thin, not sessile.
3. L. **sulphureus**, Brewer. Flowers sulphur or dull yellow, 5-7 lines long.
4. L. **Nuttallii**, Watson. Loosely woolly-hairy: petals red-purple, 6-8 lines long.
5. L. **Californicus**, Watson. Stem winged: leaflets soft-pubescent: petals 7-9 lines long, yellowish or pinkish. This and next under **L. venosus**, in Bot. Cal., etc.
6. L. **Bolanderi**, Watson. Stems wingless: glabrous: flowers purple.
7. L. **vestitus**, Nutt. Slender: stems wingless: flowers pale rose or violet.
8. L. **palustris**, L. Leaflets 2-4 pairs, linear: flowers few, purplish, small.
9. L. **litoralis**, Endl. Densely silky: a small terminal leaflet: pod hairy.
10. L. **Nevadensis**, Watson. Slender: standard purplish; wings and keel yellowish.

11. **L. Torreyi,** Gr. Acute leaflets 6 lines long: purplish flowers solitary.

14. CERCIS, Linnæus.

C. occidentalis, Torr. Small standard enclosed by the wings: pods red.

ROSACEÆ.

* *Shrubs or Trees.*

a. Flowers white, 3 lines or more across: carpels 1-5, distinct.

Carpel 1, becoming a drupe (like a cherry or plum).. 1
Carpels 5 (or often wanting), stamens 15: racemes drooping: cherry-like................ 2
Carpels 2-5, becoming inflated, usually reddening: stamens 20 or more................ 7
Carpels 5, hairy: leaves bipinnate, leaflets minute: panicles leafy...................... 8
Carpel 1, becoming an akene: low shrub: leaves tripinnate.................................. 9

b. Flowers white, 2 lines broad or less, in dense panicles: carpels 1 to 12.

Stamens 20 or more: flowers in plumose panicles: leaves large, lobed.................. 6
Stamens 10-15: evergreen leaves 2-4 lines long: panicles erect.........................18

c. Flowers rose-color or pale purple, small: carpels 5, distinct......................... 3

d. Flowers 3 lines or more across: carpels 2-5, enclosed by the fleshy calyx-tube forming an inferior ovary (partly inferior in 24).

Evergreen leaves serrate: carpels 2: stamens 10: berries scarlet.........................24
Deciduous leaves simple: flowers corymbose.
  Fruit red or yellow: no spines or thorns..25
  Fruit black or purple: spinose...26
Deciduous leaves simple: flowers racemose: petals oblong...................................27

e. Flowers 6 lines broad or more: stamens and carpels numerous: fruit like a blackberry or raspberry...10

f. Flowers solitary, axillary, small: petals none: calyx white, the limb deciduous: carpel 1 (rarely 2), long plumose tailed..11

g. Flowers rose-colored an inch or more across: stamens many: ovary apparently inferior: stems slender, prickly: leaves pinnate...23

* *Herbs.*

a. Flowers 6 lines broad or more: akenes forming a berry.......................................10

b. Flowers very small (except 1 sp. in 3), white: calyx lobes 5 (no intermediate lobes or bractlets): stamens 20 or more: carpels 3-10.

Leaves very large, tripinnate: spikes in large panicles.................................... 4
Leaves twice or thrice 3-cleft: raceme short.. 5
Leaves entire, rosulate, silky: scape low................................. 3d sp. in 3
Leaves 5-7-lobed with small basal leaflets: petals 2-3 lines long............ 4th sp. in 3

c. *Flowers yellow, white or purple: calyx appendaged between the lobes, or apparently unequally 10-lobed.*

Stamens 20 or more: carpels very numerous: receptacle conical to clavate.
Akenes with hooked or plumose tails..12
Akenes seed-like on a juicy receptacle: leaves 3-foliolate....................13
Akenes seed-like on a dry receptacle. (Try No. 16 and 17.)....................14
Stamens 20 or less: carpels few or many on a dry receptacle.
Stamens 10 (or 20 and corolla pink): corolla white: receptacle nearly naked....16
Stamens 5 to 20; filaments slender: carpels few or 1: receptacle hairy..........17
Stamens 5: carpels 5 to 10: leaflets 3, cuneate, 3-5-toothed.....................15

d. *Flowers small: carpels 1 to 3 becoming akenes enclosed by the firm calyx-tube forming a apparently inferior ovary.*

Leaves pinnate flowers in heads or spikes.
Calyx with barbed prickles: petals none: anthers purple.......................21
Calyx with a margin of hooked prickles: petals yellow..........................20
Calyx 4-angled, naked, limb petaloid: petals none..............................22
Leaves palmately lobed: greenish apetalous flowers axillary....................19

1. PRUNUS, Tournefort.

Flowers white: scraggy or spiny: leaves ovate, an inch long or less............... 1, 3
branches slender: leaves 1 to 4 inches long......................... 2, 4
low: leaves spatulate, entire, 6 lines long, sessile....................... 7
evergreen leaves, shining, prickly toothed, broad............. 5
Flowers rose-color: low, spiny: leaves oblanceolate, 6 to 12 lines long................ 6

[The first species is a small plum, the others scarcely edible cherries.]

1. **P. subcordata**, Benth. Bark ashy gray: flowers in small lateral clusters.
2. **P. emarginata**, Walpers. Bark chestnut brown: corymbs 6-12-flowered.

Var. mollis, Brewer. Taller, becoming 25 ft. high, woolly. Oregon.

3. **P. Fremonti**, Walp. Flowers solitary or few together: ovary densely hairy.
4. **P. demissa**, Walp. Dense racemes 3-4 inches long, erect: leaves large.
5. **P. ilicifolia**, Walp. Racemes small, axillary: fruit ripening in November.
6. **P. Andersoni**, Gr. Low, diffuse: leaves oblanceolate, acute: fruit velvety.
7. **P. fasciculata**, Gr. Similar: slender petals recurved: stamens 10-15:

2. NUTTALLIA, Gray.

1. **N. cerasiformis**, T. & G. Diœcious: 1 to 4 of the carpels maturing drupes.

3. SPIRÆA, Linnæus.

* *Shrubs with rose-colored or purplish flowers: carpels 5.*

1. **S. betulæfolia**: Pallas. Pale purple flowers in corymbs. Alpine.

2. S. **Douglasii**, Hooker. Darker flowers in dense panicles. Wet places.

* * Herbaceous with a woody base: flowers white.

3. S. **cæspitosa**, Nutt. Tufted: flowers in dense spikes on leafy scapes.
4. S. **occidentalis**, Watson. Simple glabrous stems 2-6 ft. high: panicle cymose.

4. ARUNCUS. Linnæus.

1. A. **sylvester**, Kost. Smooth, 3-5 ft. high: flowers diœcious: stamens exserted.

5. ERIOGYNIA, Hooker.

1. E. **pectinata**, Hook. Cespitose, creeping; branches erect: stamens included.

6. HOLODISCUS, Maximowicz.

1. H. **discolor**, Max. Flowers mostly dull white or light buff: carpels hairy.

7. PHYSOCARPUS, Maximowicz.

1. P. **opulifolia**, Max. Bark shreddy: leaves 3-lobed: corymbs 2 inches broad.

8. CHAMÆBATIARIA, Maximowicz.

1. C. **Millefolium**, Max. Leaves narrowly lanceolate, 1-3 inches long.

9. CHAMÆBATIA, Bentham.

1. C. **foliolosa**, Benth. Strong scented, viscid: leaves ovate to oblong.

10. RUBUS. Linnæus.

Stems woody: leaves simple, palmately lobed: no prickles........................ 1
Stems woody: leaves mostly 3-foliolate: more or less prickly.................. 2, 3, 4
Stems herbaceous, trailing, not prickly: carpels few............................. 5, 6

1. R. **Nutkanus**, Mocino. Large leaves: large rose-like flowers.
2. R. **leucodermis**, Dougl. Leaves white below, veins pricky. (Raspberry.)
3. R. **spectabilis**, Pursh. Flowers large, red-purple: fruit yellow or crimson.
4. R. **ursinus**, C. & S. Stems weak, often long-trailing: very prickly. (Blackberry.)
5. R **pedatus**, Smith. Leaves 3-foliolate or nearly 5-foliolate: fruit red.
6. R. **lasiococcus**, Gr. Stouter: leaves mostly 3-5-lobed: fruit tomentose.

11. CERCOCARPUS, HBK.

1. C. **parvifolius**, Nutt. Evergreen: leaves veiny, serrate above: wood hard.
2. C. **ledifolius**, Nutt. Leaves narrow, entire margins revolute. (Mt. Mahogony.)

12. GEUM, Linnæus.

1. G. **macrophyllum**, Wild. Flowers yellow: style jointed: akene-tails hooked.
2. G. **triflorum**, Pursh. Flowers purplish: styles plumose: akene-tails feathery.

13. FRAGARIA, Tournefort.

* *Akenes deeply pitted in the depressed-globose fruit.*

1. F. **Chilensis**, Ehrh, Leaves thick, dark green, shining: flowers large. Coast.
2. F. **Virginiana**, Ehrh. Similar: flowers smaller: fruit darker.

* * *Akenes on the surface of the ovoid fruit.*

3. F. **Californica**, C. & S. Light green thin leaves: petioles not silky.
4. F. **vesca**, L. Similar: larger. Perhaps No. 3 is only a variety of this.

14. POTENTILLA, Linnæus.

* *Style attached at or below the middle of the ovary.*

A foot or two high: leaflets 5-9, coarsely serrate: petals yellow or white.............. 1
Creeping: leaves and peduncles radical: leaflets 7 to many: petals yellow............. 2
Stems stout, rooting at the joints: flowers dark lurid-purple......................... 3
Shrubby leaflets entire, silky, margins revolute.................................. 4

* * *Style attached at or near the top of the ovary: stamens 20.*

Alpine or subalpine (altitude 7,000 ft. or more) leaflets an inch long or less.
    Densely white tomentose: leaflets 7 to 13: carpels stipitate................. 5
    Silky-villous: leaflets closely pinnate or palmate......................... 8, 9
    Glabrous: leaflets 3, broadly cuneiform, 7-9-toothed...................... 11
In the mountains but mostly lower than 7,000 ft.
    Leaflets 5-15, deeply serrate or pinnatifid.................................. 6, 7
    Leaflets 3, toothed above... 10, 11

1. P. **glandulosa**, Lindley. Petals usually shorter than the calyx.
Var. **Nevadensis**, Watson. More slender: stamens sometimes only 20.
2. P. **Anserina**, L. Long runners: leaflets with smaller ones between. Wet places.
3. P. **palustris**, Scop. Many fibrous roots: leaves palmate: leaflets serrate. Swamps.
P. **fruticosa**, L. Much branched: stamens 30: carpels very villous.
5. P. **Breweri**, Watson. Leaflets nearly equal, 3-6 lines long: petals large.
6. P. **Plattensis**, Nutt. Slender stems 3-12 inches long: leaflets pinnatifid.
7. P. **gracilis**, Dougl. Taller, more hairy: leaflets and flowers larger.
Var. **rigida**, Watson. Tall and stout, not tomentose. The common form.
8. P. **dissecta**, Pursh. Leaflets pinnatifid or coarsely serrate: tufted-hairy.
9. P. **Wheeleri**, Watson. Leaflets cuneate, 3-5-toothed, 6 lines long or less.
10. P. **Grayi**, Watson. Low stems 3-6-flowered: leaflets 5-7-toothed.
11. P. **gelida**, C. A. Meyer. Leaflets larger, broader, end one nearly sessile.

15. SIBALDIA, Linnæus.

1. S. **procumbens**, L. Stems creeping: calyx lobes exceeding the minute petals.

16. HORKELIA, C. & S.

Styles thickened at the base: leaflets incised 6-12 lines long........................ 1

Calyx-bracts nearly as broad as the lobes: leaflets 3-8 lines long...................... 2

Calyx-bracts much narrower than the lobes.

    Leaflets deeply incised or lobed........................... 3, 4, 5, 6

    Leaflets few-toothed at the truncate apex........................... 7

    Leaflets bifid, 2 or 3 lines long, silky........................... 8

1. H. **fusca**, Lindl. Cymes dense: petals 2 lines long, sepals longer.

2. H. **Californica**, C. & S. Glandular: sepals and petals 3-6 lines long.

Var. **sericea**, Gr. Stouter: leaflets larger: canescent with silky hairs.

3. H. **congesta**, Hook. Sparsely stiff-hairy: leaflets 6-9 lines long.

4. H. **tenuiloba**, Gr. White-hairy: leaflets 8-12 pairs, 2-3 lines long.

5 H. **Bolanderi**, Gr. Densely hoary, pubescent, tufted, 3-4 inches high.

6. H. **purpurascens**, Watson. Purplish calyx 3-4 lines long: petals rose-color.

7. H. **tridentata**, Torr. Silky: leaflets 2-5 pairs, mostly 3-toothed at apex.

8. H. **sericata**, Watson. Tufted: some stem leaflets entire: petals notched.

17. IVESIA, Torrey & Gray.

Flowers in rather close panicled cymes: stems mostly leafy. 1, 2, 3

Flowers yellow, in cymes on nearly naked stems. Alpine........................ 4, 5

Flowers white, in diffuse panicles upon leafy stems.................................. 6

1. I. **Pickeringii**, Torr. Densely white-silky: petals yellowish, spatulate.

2. I. **unguiculata**, Gr. Similar: petals white, clawed, orbicular: carpels 5-8.

3. I. **Webberi**, Gr. Low, loosely villous: petals yellow: stamens 5-10.

4. I. **Gordoni**, T. & G. Viscid: 3-10 inches high: stem leaves pinnatifid.

Var. **pygmæa**, Watson. An inch or two high: stamens sometimes 10.

Var. **lycopsoides**, Watson. Nearly glabrous: leaflets thick, rounded, imbricated.

5. I. **Muirii**, Gr. Densely silky, an inch high: leaves terete: carpels 2.

6. I. **santalinoides**, Gr. Stems 6-18 inches high: leaves silky: terete: carpel 1.

18. ADENOSTOMA, H. & A.

1. A. **fasciculatum**, H. & A. Bark becoming shreddy: leaves subulate, acute.

2. A. **sparsifolium**, Torr. Resinous: leaves scattered, obtuse. San Diego.

19. ALCHEMILLA, Tournefort.

1. A. **arvensis**, Scopoli. An obscure under-herb: stipules enclosing the flowers.

20. AGRIMONIA, Tournefort.

1. A. **Eupitoria**, L. Hairy: 2-4 ft. high: racemes spicate: akene subglobose.

21. ACÆNA, Linnæus.

1. A. **trifida**, R. & P. Leaves crowded at base: green flowers in terminal spike.

22. POTERIUM, Linnæus.

1. P. **officinale**, B. & H. Flowers deep purple or red in a short spike.
2. P. **annuum**, Nutt. Smaller: leaflets pinnatifid: flowers greenish.

23. ROSA, Tournefort.

1. R. **Nutkana**, Presl. Spines stout: stipules broad; flowers 2 or 3 inches broad.
2. R. **pisocarpa**, Gr. Globose fruit smaller, with a neck.
3. R. **Californica**, C. & S. Often tall: fruit ovoid, with a neck.
4. R. **spithamea**, Watson. A span high or less: globose fruit glandular-prickly.
5. R. **gymnocarpa**, Nutt. Slender: calyx-lobes deciduous, leaving fruit naked.

24. HETEROMELES, J. Rœmer.

1. H. **arbutifolia**, Rœm. Panicles terminal: fruit ripe in December. (*Toyon.*)

25. PIRUS, Linnæus.

1. P. **rivularis**, Dougl. Leaves simple, woolly: fruit ovoid.
2. P. **sambucifolia**, C. & S. Leaves pinnate: fruit globose, red.

26. CRATÆGUS, Linnæus.

1. C. **rivularis**, Nutt. Leaves ovate, serrate, rarely lobed. (*Hawthorn.*)
2. C. **Douglasii**, Lindl. A large tree: leaves often incised: fruit 6 lines thick.

27. AMELANCHIER, Medicus.

1. A. **alnifolia**, Nutt. Flowers in short racemes: petals not ovate. (*Shad-berry.*)

CALYCANTHACEÆ.

1. CALYCANTHUS, Linnæus.

1. C. **occidentalis**, H. & A. Inner sepals and outer petals lurid purple or red, an inch or more long, slender, leathery: inner petals shorter, incurved.

SAXIFRAGACEÆ.

§ 1. Herbs with leaves alternate or all radical (except No. 2 in 7): styles 2 or 3 (sessile stigmas 3 or 4 in 11): carpels united or rarely distinct, the tips divergent (flattened-obcordate in 12).

Stamens apparently many in clusters, only 5 perfect.............................. 11

Stamens 8-10: petals none: flowers minute, axillary, solitary........................ 12

Stamens 10 (rarely more or less in No. 1): flowers in terminal racemose or cymose clusters.

Petals broad, entire: ovary 2-celled or carpels distinct........................... 1

Petals pinnatifid, 3-7 lobed or entire: ovary 1-celled: racemes simple........... 7

Petals entire, very slender: styles slender; carpels unequal..................... 8

Stamens 5: petioles expanded stipule-like, or bristly at base.

Petals deciduous, entire, broad: radical leaves 3-parted............... No. 2 in 1

leaves 3-9-lobed or cleft: ovary inferior. 2

Petals deciduous, often crenate, white: seeds winged........................... 5

pinnatifid or 3-cleft; lobes filiform: ovary globular........... 9

entire or wanting, small: ovary 1-celled.....................10

Petals persistent, entire or 3-lobed, spatulate, violet: ovary inferior............ 3

entire, slender, purple: ovary superior....................... 4

Stamens 3: petals entire, filiform, recurved persistent.................................. 6

§ 2. Shrubs with large white flowers or woody-based herbs: leaves opposite.

Shrubs: stamens 20 or more: petals 4 or 5: stigmas distinct.....................13

petals 5 to 7: stigmas united.....................14

Herbaceous: branches terminated by capitate clusters of small flowers..........15

§ 3. Slender shrubs: leaves alternate: flowers mostly in drooping clusters: ovary inferior, globose: calyx-lobes larger than the erect petals, usually petaloid.....................16

1. SAXIFRAGA, Linnæus.

** Stemless, or rarely a leaf or two on the scape below.*

Leaves large, peltate, cupped in the center: flowers pink............................ 1

Leaves an inch or less broad, short petioled: scape 2 to 4 inches high................. 2

Leaves rounded-cordate, long petioled: filaments broadest above: calyx soon reflexed 8, 9

Leaves not cordate, contracted at base into a margined petiole or nearly sessile.

Calyx-lobes erect or spreading.................................... 3, 5

Calyx-lobes reflexed in fruit or sooner.......................... 4, 6, 7

** * Stems leafy, tufted (except No. 12): petioles short.*

Leaves small, evergreen, entire, crowded. Alpine........................... 10

Leaves like strawberry leaflets: flowers greenish............................ 11

Leaves few on the stem: stamens 5.. 12

1. **S. peltata**, Torr. Scape stout, 1-3 ft. high: carpels distinct. Streams.

2. **S. Parryi**, Torr. Calyx and white petals brown or purple-veined.

3. S. **Virginiensis,** Michx. Petals obovate, twice the length of the calyx.
4. S. **reflexa,** Hook. Calyx reflexed: filaments often thick above.
5. S. **nivalis,** L. Flowers fewer, more crowded; petals narrow, small.
6. S. **integrifolia,** Hook. Scape 1-3 ft. high, viscid: seeds large.
7. S. **bryophora,** Gr. Leaves slender, entire: many pedicels bulb-bearing.
8. S. **Mertensiana,** Bong. Leaves many-lobed: pedicels often bulbiferous.
9. S. **punctata,** L. Leaves coarsely toothed: panicle not bulbiferous.
10. S. **Tolmiei,** T. & G. Peduncles 2 inches long: carpels often 3 or 4.
11. S. **fragarioides,** Greene. Woody caudex branched: petals persistent.
12. S. **ranunculifolia,** Hook. Slender, a foot high or less: flowers corymbose.

2. BOYKINIA, Nuttall.

1. B. **occidentalis,** T. & G. Leaves thin, 1-3 inches broad, incisely toothed.
2. B. **major,** Gr. Stouter, larger: leaves 4-8 inches broad, 5-9-cleft.

3. SUKSDORFIA, Gray.

1. S. **violacea,** Gr. Weak, viscid: flower parts rarely in 7's. Or. Wash.

4. BOLANDRA, Gray.

1. B. **Californica,** Gr. Stems slender: petals dull purple. Yosemite.
2. B. **Oregana,** Watson. Stouter: petals deep purple: pedicels reflexed in fruit.

5. SULIVANTIA, Torrey & Gray.

1. S. **Oregana,** Watson. Scape nearly leafless: leaves an inch or less broad.

6. TOLMIEA, Torrey & Gray.

1. T. **Menziesii,** T. & G. Calyx gibbous, finally splitting down one side.

7. TELLIMA, Robt. Brown.

Petals laciniately pinnatifid, reflexed, rose-color or greenish........................ 1
Petals entire, spatulate-obovate, white or pinkish: calyx-base acute, adnate.......... 2
Petals entire or with small side-teeth, obovate or oval, white: calyx-base broad....... 3
Petals 3-lobed, nearly cuneate, white or pinkish: calyx-base broad: styles smooth..... 4
calyx-base turbinate, styles rough... 5
Petals deeply 3-cleft, pink or white: ovary half inferior: bulblet-bearing............. 6
Petals palmately 3-7-parted, mostly pink: ovary nearly free: bulblet-bearing......... 7

1. T. **grandiflora,** R. Br. Stout, 1-3 ft. high: calyx inflated. Monterey to Alaska.
2. T. **Cymbalaria,** Walp. Stem filiform, usually a pair of leaves. S. Cal.
3. T. **Bolanderi,** Bol. Stems often branching: styles smooth. Cent. Cal.

4. T. **heterophylla**, H. & A. Similar, very slender: petals acute. Cent. Cal.
5. T. **affinis**, Bolander. Stouter: calyx-tube rough, partly adnate. Cal.
6. T. **parviflora**, Hook. Calyx obconical: ovary half inferior. Or. Wash.
7. T. **tenella**, Walp. Slender, 2-9 in. high: ovary nearly free. N. E. Cal.

8. TIARELLA, Linnæus.

1. T. **unifoliata**, Hook. Leaves 3-5-lobed, crenately toothed. S. F. Bay, N.
2. T. **trifoliata**, L. Most of the leaves 3-foliolate. Or. to Alaska.

9. MITELLA, Tournefort.

1. M. **Breweri**, Gr. Leaves 2-3 in. broad: scape naked: petals ⅛ in. long. S.N. Mts.
2. M. **trifida**, Grah. Petals smaller, 3-5-parted. In shade. Coast Ranges.
3. M. **caulescens**, Nutt. Stouter: 1 or more leaves on scape. Klamath River, N.

10. HEUCHERA, Linnæus.

1. H. **glabra**, Willd. Leaves acutely lobed, incised: panicle loose. Or., N.
2. H. **rubescens**, Torr. Leaves crenately lobed ½-1 in. broad. S. N. Mts., N. & E.
3. H. **micrantha**, Dougl. Leaves obtusely lobed, crenate, 2-4 in. broad.
4. H. **pilosissima**, F. & M. Very villous, viscid: calyx-base rounded. Cal. Coast.
5. H. **cylindrica**, Dougl. Flowers nearly spicate, ¼-½ in. long: petals minute.

11. PARNASSIA, Tournefort.

1. P. **palustris**, L. Leaves ovate to ovate-cordate ⅛.1 in. long: petals ¼-½ in. long.

Var. **Californica**, Gr. Larger in every way. In wet places, mountains.

2. P. **fimbriata**, Banks. Leaves reniform to cordate: appendages few or a scale.

12. CHRYSOSPLENIUM, Linnæus.

1. C. **glechomæfolium**, Nutt. Decumbent in wet places: leaves ⅓-½ in. long.

13. PHILADELPHUS, Linnæus.

1. P. **Lewisii**, Pursh. Spreading, 3-5 ft. high: stigmas narrow. S. N. Mts.
2. P. **Gordonianus**, Lindl. Larger in every way: leaves mostly toothed. Coast.

14. CARPENTERIA, Torrey.

1. C. **Californica**, Torr. Leaves narrowly lanceolate. King's River, Cal.

15. WHIPPLEA, Torrey.

1. W. **modesta**, Torr. Stems slender, spreading: calyx and corolla white.

16. RIBES, Linnæus.

§ 1. More or less thorny and prickly: leaves 3-5-lobed, parted or divided: peduncles 1-5-flowered (5-9-flowered in No. 10), (*Gooseberries.*)

Calyx bright red: fruit bristly or prickly.................................. 1, 2, 4

Calyx yellow: leaves very small: fruit smooth.................................. 5, 7

Calyx white or pinkish, lobes erect: ovary white-villous; fruit velvety................ 6

Calyx greenish, villous: stamens short: fruit spiny-prickly.......................... 3

Calyx greenish or dull-purplish: ovary and fruit smooth......................... 8, 9

Calyx greenish white, limb saucer-shaped, 3 lines broad: stamens short............. 10

§ 2. Thornless, no prickles: stamens short: berry not prickly. (*Currants.*)

Calyx greenish white, rotate above the ovary: berry ⅓-1 in. long, black............. 11

Calyx waxy-white, greenish or pinkish; tube cylindrical, ¼-½ in. long................ 12

Calyx dull white, greenish or purplish; tube cylindrical-campanulate................ 13

Calyx rose-red to nearly white; tube short, broad: racemes dense: fruit dry.......... 14

Calyx golden yellow, salverform; tube ¼-½ in. long: spicy-fragrant.................. 15

1. **R. speciosum**, Pursh. Tall: Flowers nearly an inch long, parts often in 4's.
2. **R. Menziesii**, Pursh. Very thorny: anthers sharp-sagittate.
3. **R. ambiguum**, Watson. Glandular, villous: white petals nearly as long as the stamens.
4. **R. Lobbii**, Gr. Flowers 9 lines long: anthers oval: very obtuse, white.
5. **R. leptanthum**, Gr. Rigid, much branched: style undivided, smooth.
6. **R. velutinum**, Greene. Rigid recurved branches: stout thorns solitary.
7. **R. quercetorum**, Greene. Calyx-lobes ciliate, reflexed, bright yellow.
8. **R. divaricatum**, Dougl. Stems widely spreading: stamens exserted.
9. **R. oxycanthoides**, L. Similar: flowers smaller; stamens little exserted.
10. **R. lacustre**, Pciret. var. **molle**, Gr. Low: leaves downy: berry light red.
11. **R. bracteosum**, Dougl. Leaves 5-7-cleft, lobes acute, 5-9 in. wide.
12. **R. cereum**, Dougl. Leaves 3-lobed, an inch broad or less, crenate.
13. **R. viscosissimum**, Pursh. Viscid: leaves moderately lobed.
14. **R. sanguineum**, Pursh. Leaves obtusely 3-5-lobed: petals often white: variable.
15. **R. aureum**, Pursh. Glabrous or nearly so: racemes 5-10-flowered.

CRASSULACEÆ.

Obscure under herbs: minute greenish flowers in the axils of minute leaves........... 1

Very fleshy herbs: leaves entire (serrate in 1st sp. No. 2): petals distinct.............. 2

petals more or less united... 3

1. TILLÆA, Linnæus.

1. **T. minima**, Miers. Flowers clustered in the axils: leaves ovate, a line long.

2. **T. angustifolia,** Nutt. Stems rooting, 1 in. long: leaves 1-2 lines long.
Var. Bolanderi, Watson. Stems 3-4 in. high: flower-parts in 3's or 4's.
3. **T. peduncularis,** Smith. Pedicels 4-6 lines long in fruit: carpels purplish.

2. SEDUM, Linnæus.

Flowers diœcious, deep purple, parts mostly in 4's........................ 1
Leaves narrowed toward the base, obtuse.................................. 2, 3, 4
Leaves broadest near the base, acute..................................... 5, 6, 7

1. **S. Rhodiola,** DC. Stems simple: leaves acute, rarely entire. Alpine.
2. **S. spathulifolium,** Hook. Glaucous: petals yellow, 3 lines long, acute.
3. **S. Oreganum,** Nutt. Not glaucous: petals pale rose, much exceeding the stamens.
4. **S. obtusatum,** Gr. Similar to 2 & 3: flowers pedicelled; petals pale yellow, broader.
5. **S. variegatum,** Watson. Radical leaves slender: petals yellow, often purple-veined.
6. **S. radiatum,** Watson. Carpels broad, the beaks horizontal, star-like: petals yel.
7. **S. pumilum,** Benth. Annual; 1-3 inches high: leaves 1-2 lines long: carpels 1-seeded.

3. COTYLEDON, Linnæus.

Leaves cylindrical and somewhat 3-sided.................................. 1, 2
Leaves flattened: carpels nearly distinct, erect.
    Petals united to the middle, red..................................... 3
    Petals united ⅓ the length, pale yellow, 4 lines long................ 4
    Petals united only at the base, yellow or orange.
        Leaves glaucous, white dusty or mealy... 5, 6, 7, 8
        Leaves not glaucous or mealy, reddish........ 9, 10

1. **C. edulis,** Brewer. Petals widely spreading, yellowish. San Diego.
2. **C. viscida,** Watson. Leaves numerous, very viscid: corolla reddish. S. Cal.
3. **C. pulverulenta,** B. & H. Densely white-dusty: leaves 2 or 3 inches broad.
4. **C. Oregonensis,** Watson. Leaves spatulate, obtuse: racemes axillary.
5. **C. lanceolata,** B. & H. Petals orange, mid-vein glaucous: calyx-base broad.
6. **C. farinosa,** B. & H. Usually densely mealy: petals lemon yellow.
7. **C. cæspitosa,** Haworth. Sepals ovate, 2 lines long or less: petals yellow.
8. **C. laxa,** B. & H. Petals orange-yellow, keeled, prominent mid-vein glaucous.
9. **C. Palmeri,** Watson. Flowering stem red: petals pale yellow. S. Cal. coast.
10. **C. Lingula,** Watson. Leaves an inch broad, 2 or 3 inches long, acute.

DROSERACEÆ.

1. DROSERA, Linnæus.

1. **D. rotundifolia,** L. Leaf-blade rounded, 2-6 lines broad: petals 2 lines long.

2. **D. Anglica**, Hudson. Leaf-blade cuneate: petals much exceeding the sepals.

LYTHRACEÆ.

Calyx slightly 4-angled, short: petals none: capsule globular........................ 1
Petals 4: capsule striate under microscope, splitting into 3 or 4 valves................ 2
Calyx cylindrical, striate, 4 to 7 teeth with smaller ones between: petals 4 to 7 (usually 6): stamens as many or twice as many: capsule 2-celled........................ 3

1. AMMANIA, Linnæus.

1. **A. latifolia**, L. Stems square: leaves opposite, eared at base, slender.

2. ROTALA, Kœhne.

1. **R. ramosior**, Kœh. Capsule not bursting irregularly.

3. LYTHRUM, Linnæus.

1. **L. hyssopifolia**, L. Petals very small: stamens usually 4 to 6, included.
2. **L. album**, HBK. Calyx 3 or 4 lines long.
3. **L. Californicum**, Watson. Calyx 6 to 9 lines long: rose-purple petals longer.

HALORAGEÆ.

Leaves linear or broader in whorls of 4 to 12: flowers sessile, axillary................ 1
Leaves in whorls of 3 or 4, mostly pinnate, segments filiform: flowers axillary........ 2

1. HIPPURIS, Linnæus.

1. **H. vulgaris**, L. Style filiform, stamen 1: calyx globular, limb entire. In ponds.

2. MYRIOPHYLLUM, Linnæus.

1. **M. spicatum**; L. Stamens 8: flowers spicate: petals ovate, greenish.
2. **M. hippurioides**, Nutt. Stamens 4: petals white, obovate: toothed bracts 3 to 5 lines long. Both species aquatic.

ONAGRACEÆ.

* *Calyx divided to the ovary, lobes persistent: aquatic or creeping marsh herbs: solitary flowers in axils of entire leaves.*

Petals 4 to 6, yellow: stamens 8 to 12: leaves alternate.............................. 1

Petals none or 4, reddish: stamens 4: leaves opposite 2

* * *Calyx deciduous above the ovary: parts of the flowers in 4's.*

† *Anthers versatile (attached near the middle to the filament).*

a. Seeds with a tuft of silky hairs, stamens 8: lower leaves often opposite.

Calyx-tube long-funnelform above the ovary, scarlet: petals 2-lobed 3

Calyx-limb 4-parted: anthers elliptical or roundish 4

b. Seeds not tufted with hairs: leaves all alternate: calyx-lobes reflexed.

Calyx divided nearly or quite to the ovary: anthers of two forms (or only 4).

Leaves entire: small or minute flowers: capsules not an inch long 5

Leaves pinnatifidly lobed: capsules 3 or 4 inches long 6

Calyx forming a cup or tube (often long and slender) above the ovary 7

† † *Anthers erect, attached at or near the base to the filaments; those opposite the petals shorter or sterile, rarely wanting: calyx-lobes reflexed, except in No. 11: annuals.*

Calyx-tube obconical above the ovary: petals not long-clawed 8

petals long-clawed 9

Calyx-tube filiform above the ovary: petals long-clawed, lobed 10

Calyx-lobes erect: petals not clawed, 2-lobed: stigma lobes short 11

Calyx-lobes spreading: petals clawed, entire: stigma discoid, entire 12

* * * Minute white flowers in bractless racemes, the parts in 2's 13

1. JUSSIÆA, Linnæus.

1. **J. repens**, L. Stems a foot or more long, rooting at base: style stout, hairy.

Var. Californica, Watson. Smaller flowers 6 to 8 lines broad: style slender, glabrous.

2. LUDWIGIA, Linnæus.

1. **L. palustris**, Ellis. Smooth, creeping or floating: flowers sessile: capsule small.

3. ZAUSCHNERIA, Presl.

1. **Z. Californica**, Presl. Villous or tomentose: calyx 10-16 lines long above ovary.

4. EPILOBIUM, Linnæus.

* *Flowers large: stamens and style declined: stigma lobes finally spreading or recurved: perennial.*

Stem erect, simple: petals clawed, obovate, lilac-purple 1, 2

Stem decumbent, 5 to 3 inches long: leaves opposite, glaucous 3

Flowers yellow 4

* * *Flowers small, parts all erect: stigma club-shaped or cylindrical.*

Perennial: petioles present but short: in wet places: not alpine 5, 6

Perennial: stems with 2 pubescent lines: leaves mostly opposite: alpine 7, 8

Perennial: leaves sessile: hoary or glaucous: leaves mostly opposite: not alpine. 9, 10, 11

Annual: stems round: leaves mostly alternate: petals obcordate............ 12, 13, 14

1. E. **spicatum**, Lam. Simple stem often 5 or 6 ft. high: flowers spicate.
2. E. **latifolium**, Linn. Shorter, less erect, often branching: style glabrous.
3. E. **obcordatum**, Gr. Petals obcordate, spreading, rose-color. Alpine.
4. E. **luteum**, Pursh. Oregon to Alaska.
5. E. **Watsoni**, Barbey. Hoary-pubescent, branching: petals narrow, obcordate.
6. E. **coloratum**, Muhl. Erect, branched, puberulent: leaves mostly opposite.
7. E. **alpinum**, L. Creeping, 2 to 6 inches high: flower-buds ovoid: anthers globose.
8. E. **origanifolium**, Lane. Taller: large petals obcordate, purple to white.
9. E. **Franciscanum**, Barb. Stems 2 to 4 ridged: petals purple, emarginate.
10. E. **brevistylum**, Barb. Similar: petals smaller, obcordate, pinkish. S. N. Mts.
11. E. **glaberimum**, Barb. Glaucous: leaves connected at base: petals notched.
12. E. **paniculatum**, Nutt. Often tall, very slender: leaves slender, often fascicled.
13. E. **jocundum**, Gr. Similar: panicles crowded: petals larger, 6 lines long, deep purple.
14. E. **minutum**, Lindl. Less than a ft. high: petals minute.

5. GAYOPHYTUM, A. Jussieu.

1. G. **ramosissimum**, T. & G. Diffuse, 6 to 18 inches high: capsule 3-5-seeded.
2. G. **racemosum**, T. & G. Less branched, more flowers, capsule 8 to 10 lines long.
3. G. **pumilum**, Watson. Smaller: capsule 6 lines long, the many seeds oblique.
4. G. **diffusum**, T. & G. Flowers 1½ to 3 lines broad, usually pink: capsules on pedicels.

6. EULOBUS, Nuttall.

1. E. **Californicus**, Nutt. Stout, 1 to 3 ft. high: petals 4 or 5 lines broad, yellow.

7. ŒNOTHERA, Linnæus.

§ *Calyx-tube much prolonged beyond the ovary: stigma-lobes slender.*

Tall: flowers yellow, erect in bud: seeds in 2 rows in each cell....................... 1
Stems white: flowers white or purplish, 1½ or 2 inches broad: buds nodding 2, 3, 4
Stemless: calyx-tube 2 to 4 inches long: capsule wing-angled......................... 5

§ 2. *Calyx-tube filiform, stem-like above the ovary: stigma capitate: flowers yellow, sessile on the top of a rootstock in the axils of radical leaves.*

Nearly glabrous: leaves lanceolate to ovate: perennial............................ 6, 7
Canescently villous: leaves linear: capsule 4-winged: annual......................... 8

§ 3. *Calyx-tube obconic or short-funnelform: stigma capitate: capsules narrow, sessile or nearly so, often contorted.*

Flowers axillary, yellow: capsule sharply 4-angled, usually contorted........ 9, 10, 11
Flowers axillary, small, yellow: capsule obtusely angled, curved..... .... 12, 13

Flowers small, in a nodding spike, white or rose-color: capsule contorted....... 14, 15

1. **Œ. biennis**, L. Stout, 1 to 5 ft. high: calyx-tube 1 to 2½ inches long.

Var. grandiflora, Lindl. Capsule hirsute: petals as long as calyx-tube.

Var. hirsutissimus, Gr. Similar: ovary more hirsute. The common form.

2. **Œ. albicaulis**, Nutt. Erect, ½ to 4 ft. high: large leaves pinnatifid.
3. **Œ. Californica**, Watson. Hoary, decumbent: ovary and calyx villous.
4. **Œ. trichocalyx**, Nutt. Stouter, more erect: capsule thicker at base.
5. **Œ. triloba**, Nutt. Nearly glabrous: petals ½ to 1½ inches long.
6. **Œ heterantha**, Nutt. Petals 3 to 6 lines long: capsules ovoid-oblong.

Var. taraxacifolia, Watson. Leaves lyrately pinnatifid: Sierra Nevada.

7. **Œ. ovata**, Nutt. Similar: capsule with obtuse angles. Coast Valleys.
8. **Œ. graciliflora**, H. & A. Petals obcordate, turning greenish, 3 to 5 lines long.
9. **Œ. cheiranthifolia**, Hornem. Prostrate or ascending: leaves thick.

Var. suffruticosa, Watson. Woody at base, leafy. Both on sand near the sea.

10. **Œ. bistorta**, Nutt. Similar: petals 4 to 9 lines long, spot at base.
11. **Œ. micrantha**, Hornem. Flowers smaller: leaves thin, crimped.
12. **Œ. dentata**, Cav. Diffuse, very slender: leaves linear: capsule very slender.
13. **Œ. strigulosa**, T. & G. Similar: petals smaller, 1 or 2 lines long, reddening.
14. **Œ. alyssoides**, H. & A. Slender, canescent: calyx-lobes and petals 2 or 3 lines long.
15. **Œ. gauræflora**, T. & G. Glabrous: bark loose, white: capsule tapering upward.

8. GODETIA, Spach.

* *Flowers in strict mostly close spikes: stems leafy: capsule ovoid to oblong.*

† *Capsule not ribbed: seeds in 2 rows in the cell: stems simple or few branched.*

Calyx-tube broadly obconical, 4 to 6 lines long: petals 1 or 2 inches long............ 1

Calyx-tube 2 or 3 lines long, deep-purple.. 2

† † *Capsule with at least alternate sides 2-ribbed: seeds in 1 row in each cell: stems often much branched: canescently puberulent.*

Capsule 5 to 8 lines long tapering from the base.................................. 3

Capsule 3 to 6 lines long, oblong, short-hairy...................................... 4

* * *Flowers mostly scattered in a simple spike or raceme and nodding in the bud: capsule linear; seeds in 1 row: stems slender: leaves few.*

Capsules sessile, more or less distinctly ribbed............................. 5 to 9

Capsules on pedicels, not ribbed: stigmas mostly yellow.................... 10 to 13

1. **G. grandiflora**, Lindl. Stout: spike leafy: petals often with a spot. N. W. Cal.
2. **G. purpurea**, Watson. Ovary densely villous: style short: stigma-lobes purple.
3. **G. lepida**, Lindl. Stem shining white: petals rose-color with a spot above.

Var. parviflora, Watson. Petals smaller, ¼-⅜ in. long: leaves ½-1 in. long.

Var. Arnottii, Watson. Nearly glabrous: leaves longer, acute: capsule glabrous.

4. **G. albescens**, Lindl. Flowers small, in many spikelets: petals purple-blue.
5. **G. Williamsoni**, Watson. Petals yellowish at base, purple spot in center. Cal.

6. **G. quadrivulnera**, Spach. Petals purple, ¼-½ in. long: stigma-lobes purple. Coast.
7. **G. tenella**, Watson. Petals similar: style short: capsule scarcely ribbed. Coast.
8. **G. viminea**, Spach. Similar to 7: petals like 6 (or all purple) but larger.
9. **G. Romanzovii**, Spach. Ovary silky: 4 of the anthers nearly sessile: style short.
10. **G. amœna**, Lilja. Petals (and purple anthers) often villous, rose-color to white.
11. **G. Bottæ**, Spach. Petals light purple: stigma yellow or purple. Monterey, S.
12. **G. epilobioides**, Watson. Petals purple to white, ¼-½ in. long: calyx-tube short. Lakeport
13. **G. hispidula**, Watson. Hispid; often 1-flowered: 8-10 in. high. Cent. Cal.
14. **G. biloba**, Watson. A span to 4 ft. high: petals 2-lobed: rose-purple. Cent. Cal.

9. CLARKIA, Pursh.

1. **C. pulchella**, Pursh. Petals 3-lobed; claw 2-toothed: only 4 perfect stamens. Or.
2. **C. Xantiana**, Gr. Petals 2-lobed, with a tooth between; claw short. S. Cal.
3. **C. elegans**, Dougl. Petals entire; claw long, slender, naked: capsule hairy. Cal.
4. **C. rhomboidea**, Dougl. Petals entire; claw short, broad, often toothed.

10. EUCHARIDIUM, Fischer & Meyer.

1. **E. concinnum**, F. & M. Petals 3-lobed: filaments slender: capsule 6 to 9 lines long.
2. **E. Breweri**, Gr. Petals deeply 2-lobed, with a tooth between: calyx-tube longer.

11. BOISDUVALIA, Spach.

Canescently pubescent and more or less villous..................................	1, 2
Glabrous or slightly pubescent: loosely spicate..................................	3, 4

1. **B. densiflora**, Watson. Leafy spikes dense: petals 3-6 lines long.
2. **B. Torreyi**, Watson. Floral leaves like the others: petals 1 or 2 lines long. Or. S.
3. **B. glabella**, Walp. Similar: petals smaller: seeds a line long. Or. & Wash.
4. **B. cleistogama**, Curran. Capsules curved outward: seeds numerous, minute.

12. HETEROGAURA, Rothrock.

1. **H. Californica**, Rothr. Petals spatulate, 2 lines long: fruit obovoid, nut-like. Cal.

14. CIRCÆA, Linnæus.

1. **C. Pacifica**, A. & M. Leaves ovate to cordate, opposite: ovary ovoid, hairy. Woods.

LOASACEÆ.

1. MENTZELIA, Linnæus.

Leaves mostly sinuate-toothed: petals 1 to 3 lines long..............................	1, 2
Leaves mostly pinnatifid, lanceolate: petals 3 to 8 lines long.........................	3, 4

Leaves pectinately pinnatifid to sinuate-toothed: petals 1 to 2½ inches long........ 5, 6

1. **M. dispersa**, Watson. Only upper leaves ovate: seeds ½ line long.
2. **M. micrantha**, T. & G. Leaves ovate, 1 inch long or less: seeds a line long.
3. **M. congesta**, T. & G. Bracts membranous at base: petals 3 to 6 lines long.
4. **M. gracilenta**, T. & G. Petals obovate to oblanceolate, 4 to 8 lines long.
5. **M. Lindleyi**, T. & G. Leaves ovate or narrower: petals ovate. Cent. Cal.
6. **M. lævicaulis**, T. & G. Stout: leaves 2 to 8 inches long: petals 2 to 2½ inches long.

CUCURBITACEÆ.

Flowers all solitary, large, yellow: seeds flat.. 1
Flowers small, white; the sterile racemose: seeds turgid.............................. 2

1. CUCURBITA, Linnæus.

1. **C. perennis**, Gr. Leaves 6-12 in. long: flowers 3 and 4 in. long, fragrant.
2. **C. palmata**, Watson. Leaves 2-3 in. long, 5-cleft: calyx-tube an inch long.
3. **C. Californica**, Torr. Flowers an inch long or more; calyx 4 or 5 lines long.

2. MEGARRHIZA, Torrey.

1. **M. Californica**, Torr. Fruit globose or ovoid: seeds 4, 8-12 lines long.
2. **M. macrocarpa**. Fruit ovoid oblong, 14-seeded. Santa Barbara, south.
3. **M. Marah**, Watson. Fruit 4 in. long: seeds suborbicular, flattened.
4. **M. Oregana**, Torr. Fruit scarcely or not at all armed with spines. Or.-Wash.
5. **M. muricata**, Watson. Fruit globose, an inch long, 2-seeded, mostly naked.

Perhaps this genus should be united with *Echinocystis*, which has flat seeds.
The second species is described by E L. Greene under the name *Echinocystis macrocarpa*.

DATISCACEÆ.

1. DATISCA, Linnæus.

1. **D. glomerata**, B. & H. Diœcious or perfect flowers in leafy spikes, greenish.

CACTACEÆ.

Oval or cylindrical plants, covered with spine-bearing tubercles...................... 1
Depressed-globose plants with tuberculate ribs and woolly at top: spines stout, ringed 2
Cylindrical ribbed stems branching, 2 to 4 ft. high: spines numerous................. 3
Stems made up of flattened or cylindrical joints: spines barbed....................... 4

1. MAMILLARIA, Haworth.

1. M. Goodridgii, Scheer. Petals about 8, ovate, awned, dull yellowish. S. Cal.

2. ECHINOCACTUS, Link & Otto.

1. E. viridescens, Nutt. Sepals and petals numerous, greenish: fruit scaly. S. Cal.

3. CEREUS, Haworth.

1. C. Emoryi, Engelm. Flowers greenish yellow: fruit subglobose, spiny. S. Cal.

4. OPUNTIA, Tournefort.

Joints much flattened, obovate: fruit juicy 1, 2
Joints cylindrical: fruit green, fleshy: flowers red 3

1. O. Engelmanni, Salm. Flowers yellow, 3 inches long. Santa Barbara, S.
2. O. Ficus-Indica, Mill. Fruit delicious. The Prickly Pear.
3. O. prolifera, Engelm. Tree-like with spiny tubercles. San Diego.

FICOIDEÆ.

Ovary inferior: petals and stamens numerous: very fleshy 1
Ovary superior: petals none: leaves opposite or whorled.
Calyx-lobes 5, petaloid: stamens many: succulent 2
Sepals 5, greenish: stamens 3 to 10: styles 3: not succulent 3

1. MESEMBRYANTHEMUM, Linnæus.

1. M. æquilaterale, Haworth. Leaves equally 3-sided, very thick, opposite.
2. M. coccineum, Haw. Leaves semi-cylindrical, a line broad.
3. M. crystallinum, L. Leaves flat, covered with glistening papillæ.

2. SESUVIUM, Linnæus.

1. S. Portulacastrum, L. Calyx 3 to 5 lines long, more or less purplish.

3. MOLLUGO, L.

1. M. verticillata, L. Slender: leaves spatulate: flowers fascicled, axillary.

UMBELLIFERÆ.

Herbs with usually hollow stems, sheathing petioles and small flowers in simple or

compound umbels; the inferior ovary surmounted by a disk which bears 5 petals and 5 stamens: styles 2. The plants of this order are not here described.

CORNACEÆ.

Flowers in cymes or heads: petals 4: style 1: ovary 2-celled........................ 1
Flowers diœcious, in drooping blue-gray catkins: petals none: styles 2................ 2

1. CORNUS, Linnæus.

Flowers in a head with involucre of 4 to 6 large white petaloid bracts............ 1, 2
Flowers yellowish in sessile umbels appearing before the leaves: bracts 4............ 3
Flowers white or cream-color in many-flowered cymes........................ 4 to 7

1. C. **Canadensis**, L. Herbaceous, 3 to 8 inches high: leaves in a whorl at top.
2. C. **Nuttallii**, Audubon. A tree: involucre often tinged with red. (*Dogwood.*)
3. C. **sessilis**, Torr. Bark green: leaves pale and silky beneath: pedicels silky.
4. C. **Californica**, C. A. Meyer. Branches purplish: leaves ovate: cyme round-topp'd.
5. C. **pubescens**, Nutt. Similar: leaves rarely ovate: cyme larger: fruit white.
6. C. **glabrata**, Benth. Bark gray: leaves acute at each end: cymes small, flat.
7. C. **Torreyi**, Watson. Leaves ovate or narrower, acute: cyme loose: fruit white.

2. GARRYA, Douglas.

Leaves undulate, base obtuse, tomentose beneath.................................. 1
Leaves not undulate, acute at each end... 2, 3

1. G. **elliptica**, Dougl. Sterile aments 2 to 5 inches long, often clustered.
2. G. **Fremonti**, Torr. Petioles 4 to 6 lines long: aments solitary, 2 or 3 inches long.
3. G. **buxifolia**, Gr. Smaller, 2 to 5 ft. high: leaves 1 to 1½ inches long, silky beneath.

DIVISION II.—GAMOPETALÆ.

CAPRIFOLIACEÆ.

§ 1. *Corolla regular, rotate: style short; stigmas 3 to 5: flowers in cymes.*

Shrub or tree: young stems thick, pith large: leaves pinnate........................... 1
Slender shrub: leaves simple: fruit a drupe: seeds flat................................ 2

§ 2. *Corolla tubular and irregular or campanulate: stigma 1, capitate.*

A creeping herb with pendulous flowers in pairs....................................... 3

Slender shrubs with small pinkish regular flowers: berries white.................... 4
Shrubby climbers or erect shrubs with irregular tubular flowers.................... 5

1. SAMBUCUS, Tournefort.

Cymes round-topped; pith of year-old shoots yellow-brown.................... 1, 2
Cymes flat-topped, 1-sided: pith white: berries black.................... 3, 4

1. S. **racemosa**, L. Cymes ovoid or oblong: flowers dull white: berries scarlet.
2. S. **melanocarpa**, Gr. Cymes broader: flowers white: fruit black, no bloom.
3. S. **glauca**, Nutt. Leaves smooth: fruit black with a white bloom. (*Elder-berry.*
4. S. **Mexicana**, Presl. Leaves and long shoots hairy: fruit black, no bloom.

2. VIBURNUM, Linnæus.

Drupes light red, globose, acid: leaves all or some of them lobed.................... 1, 2
Drupes bluish-black, flattened, elliptical: leaves not lobed.................... 3

1. V. **opulus**, L. Cymes on several-leaved branches. Or. & Wash., E. & N.
2. V. **pauciflorum**, Pylaie. Cymes on short 2-leaved branches. Wash., N. & E.
3. V. **ellipticum**, Hooker. Leaves 3-5-ribbed: corolla 4 or 5 lines broad. N. Cal., N.

3. LINNÆA, Gronovius.

1. L. **borealis**, Gronov. Corolla funnelform, 4 or 5 lines long: stamens 4.

4. SYMPHORICARPOS, Dillenius.

Corolla broadly campanulate, 2 or 3 lines long.................... 1, 2
Corolla narrowly campanulate, 3 to 6 lines long.................... 3, 4

1. S. **racemosus**, Michx. Smooth: corolla hairy, narrow at base.
2. S. **mollis**, Nutt. Mostly soft-hairy, diffuse: corolla broad at base.
3. S. **rotundifolius**, Gr. Leaves orbicular to elliptical, 6 to 9 lines long.
4. S. **oreophylus**, Gr. Corolla 4 to 6 lines long, scarcely hairy: nutlets sharp.

5. LONICERA, Linnæus.

Erect shrubs: flowers in axillary pairs on a single peduncle.
  Ovaries ⅔ or wholly united to form a single berry: bracts subulate.................... 1, 2
  Ovaries distinct or nearly so: corolla saccate at base, yellowish.................... 3, 4
Woody climbers: flowers sessile, clustered: upper leaves often united.................... 5, 6

1. L. **cærulea**, L. Only 1 or 2 ft. high: leaves pale: corolla yellowish or purplish.
2. L. **conjugialis**, Kellogg. Corolla dull purple, bilabiate, 4 or 5 lines long.
3. L. **Utahensis**, Watson, Bracts small: berries red: peduncles short.
4. L. **involucrata**, Banks. Bracts large, becoming red: berries purple black.
5. L. **ciliosa**, Poir. Corolla an inch long, yellow to crimson-scarlet.
6. L. **hispidula**, Dougl. Corolla 6 lines long, the lobes half as long: variable.

RUBIACEÆ.

A shrub with opposite or whorled leaves: flowers in globular heads.................. 1
Herb with opposite leaves: flower parts in 4's (rarely 3's or 5's): fruit bristly.......... 2
Herbs with whorled leaves: stems square: flowers 3-4-merous: fruit biglobular........ 3

1. CEPHALANTHUS, Linnæus.

1. C. **occidentalis**, L. Corolla narrow funnelform, white, 4-lobed. (*Button-bush.*)

2. KELLOGGIA, Torrey.

1. K. **galioides**, Torr. Corolla funnelform, 3 or 4 lines long, pinkish or white.

3. GALIUM, Linnæus.

Fruit dry: leaves all in 4's, or the upper in pairs........................ 2, 3, 4, 8, 9
leaves mostly in 6's (some in 4's, 5's or 8's)..................... 1, 5, 6, 7
Fruit juicy: perennials with leaves in 4's.................................. 10 to 14

1. G. **Aparine**, L. Retrorsely hispid: leaves in 6's and 8's: fruit erect.
2. G. **bifolium**, Watson. Smooth: alternate leaves shorter: peduncles solitary.
3. G. **Kamtschaticum**, Steller. Leaves orbicular to oblong-ovate, 3-nerved.
4. G. **boreale**, L. Leaves narrow, 3-nerved: flowers white in terminal panicles.
5. G. **trifidum**, L. Leaves slender, obtuse, 4 to 7 lines long: flower parts often in 3's.
6. G. **asperrimum**, Gr. Leaves lanceolate, 6 to 12 lines long, cymes dichotomous.
7. G. **triflorum**, Michx. Sweet scented: corolla greenish or yellowish: cymes 3-rayed.
8. G. **angustifolium**, Nutt. Smooth, woody at base, rigid: fruit long-bristly.
9. G. **multiflorum**, Kellogg. Tufted, a foot high or less: leaves ovate.
10. G. **pubens**, Gr. Grayish, much branched: leaves broad, 6 lines long or less.
11. G. **Californicum**, H. & A. Similar: leaves hispid-ciliate. Coast Range.
12. G. **Nuttallii**, Gr. Tall, mostly smooth: leaves small, oval or narrower.
13. G. **Bolanderi**, Gr. Mostly smooth: corolla dull purple: berry white.
14. G. **Andrewsii**, Gr. Matted tufts 2 to 4 inches high, leaves crowded, narrow, shining, sharp.

VALERIANACEÆ.

Calyx-limb of plume-like lobes, inrolled until fruiting: leaves lobed or parted......... 1
Calyx-limb none: flowers in dense terminal clusters: leaves simple.................. 2

1. VALERIANA, Tournefort.

1. V. **sylvatica**, Banks. Stem leaves 3-11-foliolate: corolla 2 or 3 lines long.
2. V. **Sitchensis**, Bong. More robust: stem leaves 3-5-foliolate: corolla larger.

2. VALERIANELLA, Tournefort.

1. **V. macrocera**, Gr. Corolla 1 or 2 lines long, nearly regular, white or pinkish.
2. **V. congesta**, Lindl. Stouter: corolla mostly 3 or 4 lines long, bilabiate limb.
3. **V. anomala**, Gr. Freely branching: corolla a line long, spurless.
4. **V. aphanoptera**, Gr. Slender: corolla a line long, bilabiate, spur short.
5. **V. samolifolia**, Gr. Similar: fruit wingless, buckwheat-like.

DIPSACACEÆ.

1. DIPSACUS, Tournefort.

1. **D. fullonum**, L. Stiff leaves united in pairs: fruit oval, scales hooked. Nat.

COMPOSITÆ.

Sunflowers, marigolds, thistles and dandelions are types of the conspicuous plants in this order. It would be difficult for the beginner to determine the species in this order; hence it is omitted.

LOBELIACEÆ.

Ovary nearly superior: anthers distinct: branches zigzag: leaves minute................ 1
Ovary inferior: anthers united: flowers blue or red.
  Corolla red, an inch long: adnate calyx-tube hemispherical.......................... 2
  Corolla blue, rarely purple, often with white or yellow on lower lip.
    Ovary top-shaped: corolla-tube 6 to 9 lines long, hairy inside.................. 3
    Ovary obconical to club-shaped: peduncles long................................ 4
    Ovary slender, stalk-like, sessile often twisted................................ 5

1. NEMACLADUS, Nuttall.

1. **N. ramosissimus**, Nutt. Corolla a line long: unequal calyx-lobes, exceeding capsule.
2. **N. longiflorus**, Gr. Corolla 3 lines long: equal calyx-lobes shorter than capsule.

2. LOBELIA, Linnæus.

1. **L. splendens**, Willd. Simple stem 2 or 3 ft. high, ending in naked raceme.

3. PALMERELLA, Gray.

1. **P. debilis**, Gr. Stems very leafy, 1 or 2 ft. high, ending in leafy-bracted raceme.

4. LAURENTIA, Micheli.

1. **L. carnosula**, Benth. Rooting in mud, 1 to 5 inches high: leaves entire.

5. DOWNINGIA, Torrey.

1. **D. elegans**, Torr. Often 9 to 12 inches high: leaves slender: corolla blue with white and yellow spot on lower lip like the following:
2. **D. pulchella**, Torr. Lower corolla lip broader than long.
3. **D. bicornuta**, Gr. Corolla lip with a pair of hollow appendages at base.
4. **D. concolor**, Greene. Slender, diffuse: corolla blue throughout.

CAMPANULACEÆ

Capsule club-shaped, crowned with the rigid calyx-lobes, opening on top.............. 1
Capsule oblong, opening by 2 or 3 holes in the sides: seeds flattened................. 2
Capsule short, opening as in No. 2: flowers all with corolla: calyx-lobes slender........ 3
Capsule obpyramidal, bursting indefinitely: calyx-lobes ovate, toothed.... 4

1. GITHOPSIS, Nuttall.

1. **G. specularioides**, Nutt. Leaves small, coarsely toothed: flowers all alike.

2. SPECULARIA, Heister.

1. **S. biflora**, Gr. Leaves ovate to lanceolate: lower flowers apetalous, sepals 3 or 4.
2. **S. perfoliata**, A. DC. Stouter: leaves round, cordate-clasping: lower flowers similar.

3. CAMPANULA, Tournefort.

Annual: flowers erect; calyx-lobes connivent about the style in fruit.................. 1
Perennials: calyx-lobes not connivent in fruit: corolla deeply lobed.
  Style not longer than the corolla............ .... 2, 3, 4
  Style filiform, exceeding the corolla: leaves sharply serrate......... 4, 5, 6

1. **C. exigua**, Rattan. Branching and flowering from base, 2 to 8 inches high.
2. **C. scabrella**, Engelm. Whitened with short hairs, flowers erect, 5-6 lines long.
3. **C. rotundifolia**, L. Stem leaves linear: corolla bright blue, 6 to 12 lines long.
4. **C. linnæifolia**, Gr. Leaves broad, obtuse, crenately serrate: corolla light blue.
5. **C. Scouleri**, Hooker. Leaves ovate to lanceolate, short petioled: pedicels long.
6. **C. prenanthoides**, Durand. Leaves mostly sessile: flowers often clustered: pedicels short.

4. HETEROCODON, Nuttall.

1. **H. rariflorum, Nutt.** Stems filiform: leaves orbicular, toothed, small.

ERICACEÆ.

Suborder I. VACCINIEÆ.

Shrubs (some low and herbaceous): ovary inferior becoming an edible berry.......... 1

Suborder II. ERICINEÆ.

Shrubs or trees: calyx free, usually small: corolla gamopetalous (except 11, 12).

* *Fruit berry-like or fleshy: flowers drooping: corolla ovoid to campanulate with small lobes: stamens 8 or 10 included: bark shedding from at least the branches: leaves evergreen, coriaceous.*

Tree: flowers in large panicles: orange-red berries many seeded. 2
Shrubs: flowers in small racemes: fleshy fruit, 1-10 seeded.......... 3
Shrubs, low or prostrate: flowers axillary: berries black or red.......... 4

** *Fruit, a dry, many-seeded capsule: flowers nodding: anthers awn-tipped.*

Shrub, 3 or 4 ft. high: oblong leaves 1 to 3 inches long.......... 5
Shrub, a foot high or less: small scale-like leaves in 4 ranks.......... 6

*** *Fruit a dry capsule, splitting between the cells: anthers not awned.*

† *Corolla gamopetalous.*

Low Alpine evergreen; leaves revolute: flowers umbellate or corymbose:
  Leaves linear, crowded corolla not pouched.......... 7
  Leaves oblong, opposite; corolla 10-ribbed, from 10 depressed pouches.......... 8
Not alpine: leaves crowded at the ends of branches, entire.
  Corolla usually 4-toothed. ovoid to cylindrical, dull purple.......... 9
  Corolla usually 5-lobed, limb spreading, white to rose.......... 10

†† *Corolla polypetalous or nearly so.*

  Flowers in corymbs or umbels, erect, white, cherry-like.......... 11
  Flowers solitary, nodding, reddish.......... 12

Suborder III. PYROLEÆ.

Perennials, herbaceous or slightly woody with smooth evergreen leaves (except one species in No. 15): flowers nodding, polypetalous; petals broad: ovary superior: stamens 10: anthers in bud extrorse, at length by inversion introrse with 2-horned base above.

Flowers umbellate or solitary on a leafy woody stem.......... 13
Flowers solitary on a short scape: petals spreading.......... 14
Flowers in a raceme on a scape; petals concave, incurved.......... 15

Suborder IV. MONOTROPEÆ.

Herbs, parasitic upon roots: stems juicy, scaly-bracted, not green.
Stem striped, red or purple and white: sepals and bracts white.................. 16
Stem brown-red or purplish-red, clammy, hairy.................................. 17
Stem very thick; entire plant bright red.. 18
Stem white, tawny or reddish, fleshy; 19 and 20 polypetalous.
Sepals 2 to 5, bract-like: petals 3 to 6, concave at base: style tubular........ 19
Sepals and petals 4 or 5 each, lacerate-fringed, flat........................... 20
Sepals 2 or 4, petals united; filaments and style hairy......................... 21

1. VACCINIUM, Linnæus.

* *Corolla ovoid or globose, 4-5-toothed: filaments smooth;* ***anthers 2-awned on the back*** *included: leaver deciduous.*

Flowers often 2 to 4 together; corolla usually 4-toothed, leaves entire.......... 1, 2
Flowers solitary, axillary: corolla usually 5-toothed: calyx not deeply lobed.
Usually less than a foot high; leaves serrate.................................. 3, 4
Usually several (1 to 12) ft. high; branches spreading.............. 5, 6, 7
** *Corolla obovoid or campanulate, 5-toothed: leaves evergreen*........................ 8
*** *Corolla deeply 4-parted, lobes reflexed, pale rose-color: leaves evergreen*............ 9

1. **V. uliginosum,** From a span to 3 or 4 ft. high: leaves thick and veiny.
2. **V.** occidentale, Gr. Leaves thinner, less veiny: flowers mostly solitary.
3. **V.** cæspitosum, Michx. Branches not angled: berries blue. Very variable.
4. **V. Myrtillus,** L. var. microphyllum, Hooker. Branches sharply angled.
5. **V.** myrtilloides, Hooker. Branchlets slightly angled: leaves serrulate, veiny.
6. **V.** ovalifolium, Smith. Smooth, 4 to 12 ft high; branchlets angled.
7. **V. parvifolium,** Smith. Smooth; branchlets green, jointed, sharply angled.
8. **V. ovatum,** Pursh. Rigid; leaves ovate or narrower, serrate: flowers clustered.
9. **V. oxycoccus, L. var.** intermedium, Gr. Trailing, slender: flowers umbellate.

2. ARBUTUS, Tournefort.

1. **A. Menziesii, Pursh.** Leaves 3 to 5 inches long; corolla white, broad-ovoid.

3. ARCTOSTAPHYLOS, Adanson.

a. Seeds not united or easily separable.
Low or creeping, rising only a foot or two: flowers 1 or 2 lines long.
Trailing or creeping, green, no bristly hairs, ovary and fruit glabrous.. 1, 2
Erect: leaves mostly not an inch long: flowers more numerous...... 3, 4, 5
Erect, 3-20 ft. high: flowers 3-4 lines long: fruit 4-5 lines thick........... 6, 7, 8
b. Seeds united into a solid woody or bony stone........................... 9 to 12

1. **A. Uva-ursi,** Spreng. Leaves oblong-spatulate, retuse, tapering to petiole.

2. A. **Nevadensis**, Gr. Leaves obovate or narrower, cuspidate-mucronate, obtuse at base.
3. A. **pumila**, Nutt. Tomentulose, pale leaves oblong-obovate obtuse or retuse.
4. A. **Hookeri**, Don. Diffuse: leaves green, ovate or oval, cuspidate or acuminate.
5. A. **nummularia**, Gr. Very leafy: leaves mostly broadly oval, ends rounded.
6. A. **Andersoni**, Gr. Leaves thin, bright green, base sagittate or cordate.
7. A. **tomentosa**, Dougl. Branchlets bristly: leaves pale, ovate or narrower.
8. A. **pungens**, HBK. Leaves rigid, oblong-lanceolate to round-ovate, entire.
Var. **platyphylla**, Gr. Leaves paler, broader, 1 or 2 inches long; not cuspidate.
9. A. **glauca**, Lindl. Larger (8 to 24 ft. high): fruit larger: glabrous branchlets.
10. A. **bicolor**, Gr. Leaves tomentose beneath: flowers rose-color 3 or 4 lines long.
11. A. **Clevelandii**, Gr. More hairy; leaves narrower, sessile, acuminate.
12. A. **polifolia**, HBK. Leaves linear-lanceolate: fruit rough, purple.

4. GAULTHERIA, Linnæus.

Flowers in slender but stiff, often branching, bracteate, viscid racemes................ 1
Flowers axillary, solitary; filaments glabrous; anthers not awned................. 2, 3

1. G. **Shallon**, Pursh. Spreading, 1 to 4 ft. high; leaves 2 to 4 inches long; serrulate.
2. G. **Myrsinites**, Hooker. Spreading in tufts: leaves oval or orbicular ½ inch long.
3. G. **ovatifolia**, Gr. Larger: leaves broadly ovate to subcordate. Or. N.

5. LUCOTHOE, Don.

1. L. **Davisæ**. Torr. Flowers in terminal, often clustered racemes, white, S. N. Mts.

6. CASSIOPE, Don.

1. C. **Mertensiana**, Don. Leaves keeled, not furrowed on back, 1½-2 lines long.
2. C. **tetragona**, Don. Leaves thick, deeply furrowed on back, often pubescent.
3. C. **lycopodioides**, Don. Stems creeping filiform: leaves barely a line long.

7. BRYANTHUS, Steller.

1. B. **Breweri**, Gr. Corolla rose-purple, 5-cleft to the middle, 4-5 lines broad.
2. B. **empetriformis**, Gr. Corolla smaller slightly lobed: stamens included.

8. KALMIA, Linnæus.

1. K. **glauca**, Ait. Leaves glaucous, white beneath: flowers saucer-shaped. Alpina.

9. MENZIESIA, Smith.

1. M. **glabella**, Gr. Leaves obovate, usually obtuse: filaments ciliate below.
2. M. **ferruginea**, Sm. Leaves oblong or broadly oblanceolate, acute, rusty-hairy.

10. RHODODENDRON, Linnæus.

Deciduous: flowers from lateral buds, nodding; corolla nearly rotate.................. 1
flowers from terminal buds; tube funnel-form; limb spreading............ 2
Evergreen: many-flowered corymbs terminal: corolla campanulate, lobes broad....... 3

1. R. **albiflorum**, Hooker. Low: corolla white, 5-cleft: stamens included.
2. R. **occidentale**, Gr. Taller: corolla white, viscid; stamens exserted.
3. R. **Californicum**, Hooker. Leaves 3 to 6 inches long: corolla rose-purple.

11. LEDUM, Linnæus.

1. L. **latifolium**, Ait. Leaves rusty-tomentose below, margins strongly revolute.
2. L. **glandulosum**, Nutt. Leaves whitish beneath, resinous, scarcely revolute.

12. CLADOTHAMNUS, Bongard.

1. C. **pyrolæflorus**, Bong. Tall, slender, smooth: sepals equaling the petals.

13. CHIMAPHILA, Pursh.

1. C. **Menziesii**, Spreng. Leaves often mottled above: peduncle 1-3-flowered.
2. C. **umbellata**, Nutt. Taller (1 or 2 ft. high) leaves not spotted: flowers 4 to 8.

14. MONESES, Salisbury.

1. M. **uniflora**, Gr. Corolla white or rose-tinged, ½-¾ in. broad. Cold bogs.

15. PYROLA, Tournefort.

Stamens connivent about the straight style, not declined: stigma peltate........... 1, 2
Stamens and style bending downward then upward: style exserted.
Corolla greenish white: calyx-lobes short............................ 3, 4, 6
Corolla rose-purple or purplish: scaly bracts large......................... 5
Leaves sometimes veined or splotched with white....................... 5, 6
Leaves wanting: scapes reddish: petals obovate, white...................... 7

1. P. **minor**, L. Leaves orbicular, an inch long or less: style short.
2. P. **secunda**, L. Leaves ovate, 1 to 2 inches long: petals oblong: style long.
3. P. **chlorantha**, Swartz. Leaves orbicular, 5 to 8 lines long: sepals obtuse.
4. P. **elliptica**, Nutt. Leaves 1½ to 2½ inches long, longer than the petioles.
5. P. **rotundifolia**, L. Leaves orbicular or nearly so, shining above. Only the var. **bracteata**, Gr., found on this coast, which often has large white-banded leaves.
6. P. **picta**, Smith. Leaves broadly ovate to narrow or spatulate, coriaceous.
7. P. **aphylla**, Smith. Scapes a span to a foot high: bracts subulate.

16. ALLOTROPA, Torrey & Gray.

1. A. **virgata**, T. & G. Thick and densely bracteate at base, ending in a long spike.

17. PTEROSPORA, Nuttall.

1. **P. andromedea**, Nutt. Pedicels slender, soon recurved: corolla globose, white.

18. SARCODES, Torrey.

1. **S. sanguinea**, Torr. A span to a foot high: flowers erect on thick pedicels.

19. MONOTROPA, Linnæus.

1. **M. uniflora**, L. Smooth: mostly white, rarely flesh-color: single flower nodding.
2. **M. Hypopitys**, L. Tawny or flesh-color: petals 4, except in terminal flower.
3. **M. fimbriata**, Gr. Bracts and spatulate sepals lacerate-fringed: petals mostly 3.

20. PLEURICOSPORA, Gray.

1. **P. fimbriolata**, Gr. Brownish, stout: anthers opening lengthwise: ovary 1-celled.

21. NEWBERRYA, Torrey.

1. **N. congesta**, Torr. Flowers capitate: corolla-tube longer than the lobes.
2. **N. spicata**, Gr. Flowers spicate: corolla-tube broader, as long as the lobes.

LENNOACEÆ.

1. PHOLISMA, Nuttall.

1. **P. arenarium**, Nutt. Brownish or reddish stems in clumps: spike 1 or 2 inches long: purplish: corolla exceeding the linear bracts and sepals. Monterey, S.

PLUMBAGINACEÆ.

Petaloid calyx scarious, plicate: petals long clawed: styles filiform.
Leaves oblong or spatulate: scapes branching paniculately: spikes 1-sided............ 2
Leaves grass-like: simple scapes bearing a globose head of purplish flowers........... 3

2. STATICE, Tournefort.

1. **S. Limonium**, L. var. Californica, Gr. Lavender flowers in compound spikes.

3. ARMERIA, Willdenow.

1. **A. vulgaris**, Willd. Short-pediceled flowers surrounded by scarious bracts.

PRIMULACEÆ.

Leaves all radical: nodding flowers on a naked scape in a bracteate umbel....... 1
Leaves radical or crowded on tufted stems, cuneate-spatulate, 5-7-toothed at apex.... 2
Leaves in a whorl at top of stem, bracts below: corolla rotate, rose to white.......... 3
Leaves all or mostly opposite: flowers axillary.
    Flowers small, yellowish, in close clusters; corolla rotate...................... 4
        apetalous, solitary, purplish or white........................ 5
        solitary: corolla rotate on slender pedicel......................... 6
Leaves all or mostly alternate: flowers solitary, minute.............................. 7
        flowers in paniculate racemes, very small............. 8

1. DODECATHEON, Linnæus.

* *Short filaments united to form with the closely connivent anthers a dark colored beak surmounting the short corolla tube.*

Capsule obtuse, splitting at or from the apex into valves.
    Leaves from narrowly to broadly spatulate: capsule oblong or longer.......... 1
    Leaves obovate or oval, short, base cuneate: capsule globular................. 2
Capsule cylindraceous; apex not splitting, but coming off as a lid.................... 3

* * *Short distinct filaments included in the corolla throat, only the anthers exserted: leaves oval or ovate to oblong, not tapering at base*..................................... 4

1. **D. Jeffreyi,** Moore. Often very large: capsule exceeding calyx.
2. **D. ellipticum,** Nutt. Leaves ½ to 2 inches long: calyx minutely glandular.
3. **D. Hendersoni,** Gr. Like the last except the thin-walled exserted capsule.
4. **D. frigidum,** C. & S. var. dentatum. Leaves commonly repand or dentate.

2. PRIMULA, Linnæus.

1. **P. suffrutescens,** Gr. Scape 2 to 4 inches long: umbel of several red-purple flowers.

3. TRIENTALIS, Linnæus.

1. **T. Europæa,** L. Flowers on slender pedicels among the leaves. Our plants are:

Var. latifolia, Torr., with leaves mostly acute, ½ to 4 inches long, and
Var. arctica, Ledeb., with obtuse or retuse leaves an inch long or less.

4. LYSIMACHIA, Tournefort.

1. **L. thyrsiflora,** L. Leaves lanceolate: small teeth between corolla lobes.

5. GLAUX, Tournefort.

1. **G. maritima,** L. Succulent, pale green, 3 or 4 inches high, leafy.

6. ANAGALLIS, Tournefort.

1. A. **arvensis**, L. Square stems: leaves ovate: corolla often salmon-purple.

7. CENTUNCULUS, Dillenius.

1, C. **minimus**, L. Slender: corolla lobes acute, shorter than calyx.

8. SAMOLUS, Tournefort.

1. S. **Valerandi**, L., var. **Americanus**, Gr. Corolla white, a line long or less.

STYRACACEÆ.

1. STYRAX, Tournefort.

1. S. **Californica**, Torr. Shrub: spatulate corolla lobes, 8 or 9 lines long, white.

OLEACEÆ.

1. FRAXINUS, Tournefort.

1. F. **dipetala**, H. & A. Leaflets serrate: petals 2, white, 2 lines long.
2. F. **Oregana**, Nutt. Leaflets mostly entire: flowers diœcious, apetalous.

APOCYNACEÆ.

Flowers in terminal cymes: corolla campanulate, white or pinkish.................... 1
Flowers on scape-like peduncles: corolla short: funnelform, rose-purple.............. 2

1. APOCYNUM, Tournefort.

1. A. **androsæmifolium**, L. Spreading: leaves ovate: corolla 3 or 4 lines long.
2. A. **cannabinum**, L. More strict: leaves narrower, nearly sessile: corolla smaller.

2. CYCLADENIA, Bentham.

1, C. **humilis**, Benth. Smooth, low: corolla 9 lines long, throat hairy: style long.
Var. **tomentosa**, Gr. Densely hairy: leaves 2 or 3 pairs, 1 to 3 inches long.

ASCLEPIADACEÆ.

Stem twining: anthers with scale-like appendages: corolla rotate.................... 1
Stem erect: anthers with hooded or cup-like appendages: petals reflexed.

Hoods with horn-like process within	**2**
Hoods cleft at the back (outside), hornless	**3**
Hoods cleft on the inside, hornless	**4**

1. PHILBERTIA, HBK.

1. **P. linearis, var. heterophylla**, Gr. **Corolla 6 lines broad, dull-colored. S. Cal.**

2. ASCLEPIAS, Linnæus.

Corolla-lobes 4 or 5 lines long: hoods 5 or 6 lines long, back prolonged	1
Corolla-lobes whitish, 3 lines long: hoods truncate; horns little exserted	2
Corolla-lobes greenish, 3 or 4 lines long: hoods appendaged on sides	3
Corolla-lobes whitish, ovate, 3 lines long	4
Corolla-lobes greenish or purplish, 3 lines long: horns triangular, obtuse	5
Corolla-lobes greenish or purplish, 2 lines long: horns slender, exserted	6

1. **A. speciosa**, Torr. Stout, 2 to 5 ft. high: follicles with soft spines.
2. **A. Fremonti**, Torr. A foot high or less: short-woolly: leaves obtuse.
3. **A. erosa**, Torr. Leaves ovate or narrower, acuminate, margins scarious.
4. **A. eriocarpa**, Benth. Densely woolly: leaves often in 3's, 4 to 8 inches long.
5. **A. vestita**, H. & A. Dense white wool deciduous in age: leaves very acute, long.
6. **A. Mexicana**, Cav. Smooth; slender leaves in whorls, 3 to 6 inches long.

3. SCHIZNOTUS, Gray.

1. **S. purpurascens**, Gr. Decumbent or prostrate: **leaves cordate: corolla reddish.**

4. GOMPHOCARPUS, Robt. Brown.

1. **G. cordifolius**, Benth. Smooth: loosely flowered: corolla dark purple-red.
2. **G. tomentosus**, Gr. Woolly: stem angled: corolla greenish or purplish.

GENTIANACEÆ.

Corolla from funnelform to salverform: leaves opposite.	
Corolla yellow, 4-lobed: anthers not twisted	1
Corolla red, 3-5-lobed: anthers spirally twisted in age	2
Corolla blue or white: stigma flat, nearly sessile	3
Corolla rotate, 4-parted with fringed glands: leaves opposite or whorled	**4**
Corolla campanulate: leaves alternate or radical, 3-foliolate or reniform	**5**

1. MICROCALA, Link.

1. **M. quadrangularis**, Griseb. **Slender, 2 or 3 inches high: calyx 4-angled.**

2. ERYTHRÆA, Renealm.

Corolla-lobes 1½ to 2½ lines long; tube much longer: anthers oblong............. 1, 2, 3
Corolla-lobes 3½ to 6 lines long: tube a little longer; anthers linear................. 4, 5

1. E. **floribunda**, Benth. Pedicels short or none: corolla-lobes 2 lines long or less.
2. E. **Muhlenbergii**, Griseb. Pedicels short or 2-bracted; corolla-lobes obtuse.
3. E. **Douglasii**, Gr. Pedicels slender: corolla-lobes obtuse: seeds globular.
4. E. **trichantha**, Griseb. Flowers often corymbose, some sessile, lobes acute.
5. E. **venusta**, Gr. Flowers pediceled: corolla-lobes obtuse, tube yellowish.

3. GENTIANA, Tournefort.

a. Corolla without plaited folds or appendages between the lobes.
Flowers solitary on terminal peduncle, 12 to 18 lines long......................... 1, 2
Flowers several, smaller, 5 to 7 lines long: calyx 5-cleft............................ 3

b. Corolla with folds between the (usually 5) lobes which are prolonged into thin teeth or accessory lobes; stigmas distinct: pod on a stipe.
Annual: anthers introrse: stem leaves ovate-cordate 2 to 4 lines long................ 4
Perennial: anthers more or less extrorse: usually a pair of bracts or leaves under the short-peduncled or sessile flower.
  Stems several from one caudex, 1-2-flowered: stem-leaves connate-sheathing.
    Stems 1-flowered, 2 to 4 inches high: radical leaves rosulate.............. 5
    Stems longer: upper pair of leaves enclosing the flower................ 6, 7
  Stems many-leaved: style manifest, corolla blue or bluish.
    Corolla-lobes broad, narrowed at base; accessory lobes entire........... 8, 9
    Corolla-lobes not narrowed at base: accessory lobes laciniate......... 10, 11

1. G. **serrata**, Gunner, var. holopetala, Gr. Calyx angular, lobes keeled.
2. G. **simplex**, Gr. Leaves linear-oblong, 3 to 9 lines long: calyx hardly angular.
3. G. **Amarella, L. var. acuta**, Engelm. Stem acute-angled: capsule sessile.
4. G. **Douglasiana**, Bong. Cymosely branched: radical leaves rosulate.
5. G. **Newberryi**, Gr. Radical leaves obovate to spatulate: corrolla 18 lines long.
6. G. **setigera**, Gr. Stems decumbent: 1 or 3 bristles between corolla-lobes.
7. G. **calycosa**, Griseb. Stems erect: accessory corolla-tubes laciniate or 2-cleft.
8. G. **Menziesii**, Griseb. Stems slender, a ft. long or less: leaves 1½ in. long or less
9. G. **sceptrum**, Griseb. Stem 2 to 4 ft. high: leaves broader, 1½ to 3 in. long.
10. G. **Oregana**, Engelm. Corolla over an inch long, lobes roundish.
11. G. **affinis**, Griseb. Corolla an inch long or less, lobes ovate, acute.

4. FRASERA. Walter.

Stout, 2 to 5 ft. high: leaves not white margined................................. 1, 2
Gray-green, 1 to 3 ft. high: leaves with cartilaginous white margins............ 3, 4, 5

1. F. **thyrsiflora**, Hook. Leaves in 2's or 3's: a gland on each corolla-lobe.

2. **F. speciosa**, Dougl. Leaves in 4's and 6's: 2 glands on each corolla-lobe.
3. **F. Parryi**, Torr. Leaves in 2's or 3's: corolla white, glands lunate-obcordate.
4. **F. nitida**, Benth. Slender: light blue corolla often greenish spotted.
5. **F. albicaulis**, Dougl. Similar but minutely puberulent: glands linear-oblong.

5. MENYANTHES, Tournefort.

1. **M. trifoliata**, L. Leaves 3-foliolate: flowers racemose: corolla bearded.
2. **M. Christa-galli**, Menz. Leaves reniform: flowers cymose, crested.

POLEMONIACEÆ.

Leaves entire, opposite: corolla salverform, rose-purple to white: stamens inserted at unequal heights: perennials.. 1

Leaves various; rarely all opposite and entire, then the stamens are inserted at equal heights: corolla from salverform and funnelform to almost rotate 2

Leaves simply pinnate, alternate; leaflets entire, apex sharp: corolla rotate to funnelform: stamens declined, hairy at base.. 3

1. PHLOX, Linnæus.

Matted cushion-like, evergreen: leaves narrow, crowded, 3 to 6 lines long.

Woolly, in mats 2 to 4 inches high: leaves imbricated, recurved................ 1

Not woolly: leaves rigid, hispid-ciliate, sometimes recurved.... 2

Not woolly, less densely tufted: leaves narrower, less rigid..................... 3

Loosely tufted: leaves linear to ovate, mostly exceeding an inch long.

Leaves very narrowly linear, style long, slender.......................... 4, 5

Leaves linear to ovate: corolla usually 6 to 10 lines broad.................. 6, 7

1. **P. canescens**, T. & G. Corolla white, 6 to 9 lines long, tube exserted.
2. **P. cæspitosa**, Nutt. Corolla tube a little exceeding the calyx lobes.
3. **P. Douglasii**, Hook. Leaves with margins naked or ciliate at base.
4. **P. linearifolia**, Gr. Much branched: leaves 1 or 2 inches long a line wide.
5. **P. longifolia**, Nutt. Similar but lower and cells mostly 1-ovuled.
6. **P. adsurgens**, Torr. Smooth leaves ovate or narrower: corolla-tube long.
7. **P. speciosa**, Pursh. Leaves lanceolate to linear: corolla tube and style short.

2. GILIA, Ruiz & Pavon.

* ***Leaves opposite, at least below, palmately parted into linear or filiform divisions** (entire in 8 and rarely in 10).*

Diffusely branching to nearly simple stems: corolla nearly rotate to salverform.

Flowers scattered on filiform pedicels.................................. 1 to 8

Flowers sessile, a few together or solitary.............................. 9, 10

Simple or sparingly branched: flowers sessile in dense leafy-bracted heads: corolla salverform

Corolla-tube little or not at all exserted beyond the leafy bracts...... **11, 15, 16**

Corolla tube much exserted.................................... **12, 13, 14**

** *Leaves alternate, lobed or parted; rarely a few entire or opposite.*

† *Leaves palmately parted into rigid pungent divisions: stems woody: flowers large, sessile: corolla salverform: stamens included*.................... **17, 18**

†† *Leaves pedately 5-7-parted: soft-hairy perennials.*

Flowers white in dense heads: some leaves 3-parted or entire............ .. **34**

Flowers violet or purplish, solitary, subsessile in forks or axils............... **35**

††† *Leaves pinnately incised cleft or divided, rarely a few entire or opposite: bracts sometimes nearly palmately cleft.*

a. Flowers in dense leafy-bracted clusters or heads: lobes of the calyx, bracts and upper leaves mostly rigid and pungent.

Much branched annuals: sometimes viscid: never woolly except in the heads: stigmas often only 2.

At least some of the leaves bipinnatifid.

More or less viscid; odor disagreeable................................ **19, 20**

Not viscid: leaf-segments filiform................................ **21** to **24**

Leaves simply pinnatifid or many entire.

Not viscid; bracts and calyx fine-woolly.................................. **25**

Viscid................................ .... **26** to **28**

Densely woolly, at least when young: corolla salverform: stamens exserted.

Leaves rigid, not viscid: filaments exserted; anthers sagittate........... **29** to **33**

Leaves not rigid: petioles broad: flowers small, white, numerous.............. **34**

b. Inflorescence bractless or nearly so: leaves not rigid or pungent.

Stems from creeping rootstocks, 1 or 2 incher high................................ **35**

Flowers in long-pedunculate ovoid heads: leaf-lobes filiform.................... **36, 37**

Flowers clustered or solitary: leaf-lobes slender (except 41).................... **38** to **44**

Corolla pinkish, slender, twice as long as calyx............................. **45, 46**

*** *Leaves entire (rarely 2 or 3 small lobes), alternate, or the lower opposite, sessile: corolla salverform to funnelform: stamen unequally inserted: more or less viscid annuals.*

Flowers on filiform peduncles: corolla pink, 5 to 10 lines long........................ **47**

Flowers in loose cluster or scattered: calyx-lobes slender.... .... **48**

Flowers in the forks and upper axils: calyx-lobes awn-like.......................... **49**

Flowers in leafy-bracted capitate clusters or a few scattered.

Calyx-lobes acute: corolla 5 lines long...................................... **50**

Calyx-lobes obtuse: corolla 10 to 15 lines long................................ **51**

§ 1. Dactylophyllum, Gray.

1. **G. liniflora**, Benth. Corolla white or pinkish, nearly rotate. W. Cal.

Var. pharnaceoides, Gr. Smaller: the flowers half as large, 3 to 5 lines broad.
2. G. **pusilla**, Benth. Corolla short funnelform, 2 or 3 lines long, throat yellowish.
Var. Californica, Gr. Corolla larger, twice as long as calyx. Common form.
3. G. **Harknessii**, Curran. Corolla white, 1 or 2 lines long, tube equaling lobes.
4. G. **Bolanderi**, Gr. Corolla purplish, lobes exceeding the narrow tube.
5. G. **ambigua**. Tube, dark throat and lilac-purple limb, each 2 lines long.
6. G. **Rattani**, Gr. Less branched: corolla tube long exserted, slender. Cent. Cal.
7. G. **aurea**, Nutt. Diffuse: leaves hispidulous: very small: corolla yellow.
Var. decora, Gr. Corolla white or purplish, throat often dark. Cent. Cal. S.
8. G. **dianthoides**, Endl. Corolla lilac or purple, large, lobes fringed. S. Cal.
9. G. **Lemmoni**, Gr. Leaves minute: calyx lobes rigid: corolla yellow. S. Cal.

§ 2. Linanthus, Endl., Benth.

10. G. **dichotoma**, Benth. Smooth: corolla salverform, satiny-white, large.

§ 3. Leptosiphon, Endl., Benth.

11. G. **densiflora**, Benth. Stout: leaf-lobes stiff: corolla 8 to 10 lines broad.
12. G. **androsacea**, Steudel. Very variable: corolla-throat yellow or dark.
13. G. **micrantha**, Steud. Corolla very slender, usually yellow.
14. G. **tenella**, Benth. Leaves hispidulous-ciliate: corolla pink, throat yellow.
15. G. **ciliata**, Benth. Rigid, grayish-hispid: corolla rose color.

§ 4. Siphonella, Gray.

16. G. **Nuttallii**, Gr. Perennial: corolla white; throat broad, yellow.

§ 5. Leptodactylon, Bentham.

17. G. **Californica**, Benth. Corolla often 18 lines broad. Coast.
18. G. **pungens**, Benth. Viscid: corolla smaller. Sierra Nevada.

§ 6. Navarretia, Gray,

19. G. **squarrosa**, H. & A. Corolla blue to white: stamens included.
20. G. **cotulæfolia**, Steud. Less viscid: stamens exserted.
21. G. **intertexta**, Steud. Calyx and spiny bracts white and woolly at base.
22. G. **Breweri**, Gr, Less pungent: corolla yellow, 3 or 4 lines long.
23. G. **leucocephala**, Gr. Erect or branches procumbent, pale green.
24. G. **prostrata**, Gr. Similar; prostrate branches from a central head.
25. G. **divaricata**, Torr. Heads small; bracts nearly palmately cleft.
26. G. **filicaulis**, Torr. Small corolla similar, but stamens exserted.
27. G. **viscidula**, Gr. Stout, Diffuse: corolla violet to purple.

Var. heterodoxa, Gr. Slender bracts broad, less rigid: corolla tube shorter.
28. G. **atractyloides**, Steud. More rigid and viscid: mint scented.

§ 7. Hugelia, Gray.

29. G. **densifolia**, Benth. Corolla violet-blue, tube much exserted.
30. G. **virgata**, Steud. More slender: flowers fewer, blue or lavender.
Var. floribunda, Gr. Corymbose branches ending in dense heads.
31. G. **floccosa**, Gr. Corolla tube 3 or 4 lines long: anthers shorter.
32. G. **filifolia**, Nutt. Corolla lobes a line long: anthers cordate-oval.
33. G. **lutescens**, Steud. Corolla yellow, 3 lines long: pod 3-seeded.

§ 8. Elaphocera, Nuttall.

34. G. **congesta**, Hook. Leaves pedately 5-7-parted, lobes 2 lines long.

§ 9. Eugilia, Bentham, Gray.

35. G. **debilis**, Watson. Soft hairy: Flowers sessile among crowded leaves.
36. G. **capitata**, Dougl. Flowers light blue: calyx scarcely hairy.
37. G. **achilleæfolia**, Benth. Flowers violet to lavender: calyx-tips recurved.
39. G. **multicaulis**, Benth. Corolla violet, 4 lines long: capsule ovoid.
40. G. **tricolor**, Benth. Corolla-lobes violet or lilac, throat dark purple.
41. G. **latifolia**, Gr. Corolla 9 or 10 lines long, purple with dark throat.
42. G. **tenuiflora**, Benth. Corolla narrow, 7 to 9 lines long, rose and violet.
43. G. **inconspicua**, Dougl. Corolla narrow, 3 to 5 lines long, variable.

§ 10. Ipomopsis, Bentham.

44. G. **aggregata**, Spreng. Large corolla, scarlet to white, dotted; lobes acute.
Var. Bridgesii, Gr. Lower, 6 to 18 inches high: corolla bright red. S. N. Mts.

§ 11. Courtoisia, Gray.

45. G. **glutinosa**, Gr. Calyx rounded at base, deeply cleft: capsule globular.
46. G. **heterophylla**, Dougl. Diffuse: calyx-base acute: clusters close.
47. G. **capillaris**, Kellogg. Calyx small: corolla-lobes equaling throat.

§ 12. Collomia, Gray.

48. G. **gracilis**, Hook. Leaves narrow; lowest opposite, broader.
49. G. **aristella**, Gr. Corolla purplish 4 to 6 lines long: capsule 3-lobed. N. Cal. N.
50. G. **linearis**, Nutt. Corolla lilac-purple to white, slender.
Var. subulata, Gr. Low, much branched, flowers few in lower forks.
51. G. **grandiflora**, Dougl. Corolla salmon color, 12 lines long.

8. POLEMONIUM.

Tufted, more or less viscid: corolla funnelform: alpine.......................... 1, 2
Stems 1 to 3 ft. high: leaflets mostly an inch or more long.......................... 3, 4
Slender, much branched: leaflets 2 to 4 lines long: annual.......................... 5

1. P. **confertum**, Gr. Small leaflets 2-3-divided: flowers in heads, 6 to 12 lines long.
2. P. **humile**, Willd., var. pulchellum, Gr. Leaflets entire: flowers fewer.
3. P. **cœruleum**, L. Flowers blue, numerous, in a narrow naked panicle.
4. P. **carneum**, Gr. Corolla salmon or flesh color, often over an inch long.

Var. **luteum**, Gr. Corolla yellow, lobes (as in the species) broadly obovate. Or.

5. P. **micranthum**, Benth. Corolla whitish, nearly rotate, small.

HYDROPHYLLACEÆ.

§ 1. Ovary and pod globose, 1-celled, lined with a pair of expanded placentæ: corolla usually convolute in the bud. Herbs.

* *Stamens and style much exserted: calyx not enlarged in fruit: flowers in dense clusters or heads: leaves alternate: perennial*.......................... 1

* * *Stamens shorter than the corolla: calyx enlarging in fruit: flowers scattered or in loose clusters: lower and sometimes all the leaves opposite: annual:*

Calyx with reflexed appendages between the lobes.......................... 2
Calyx not appendaged: the lobes broad and obtuse: corolla white.......................... 3

§ 2. Ovary 1-2-celled: calyx deeply parted: corolla imbricated in the bud.

Leaves all entire and opposite.......................... 4
Leaves all or all but the lowest alternate simple or compound: style 2-cleft.
    Corolla deciduous, not yellow.......................... 5
    Corolla persistant, yellow.......................... 6
Leaves mostly radical, long petioled, round-cordate, crenately 7-8-lobed.
Style and stigma entire: cymes bractless, racemose.......................... 7
Leaves and 1-flowered peduncles all radical: corolla lobes 5 to 7.......................... 8

§ 3. Ovary completely or nearly 2-celled: styles distinct, the tips thickened: corolla imbricated not appendaged: leaves simple.

Woody at base or tufted: corolla narrow funnelform.......................... 9
Shrubs; leaves thick, toothed: cymes terminal.......................... 10

1. HYDROPHYLLUM, Tournefort.

1. H. **capitatum**, Dougl. Leaves 5-7-parted, lobes 2-3-cleft.
2. H. **occidentale**, Gr. Leaves 7-15-parted, lobes cleft, obtuse.

Var. **Watsoni**, Gr. Almost stemless, softer hairy.

3. H. **Virginicum**, L. Leaves bright green, nearly smooth, 3-5-parted.

2. NEMOPHILA, Nuttall.

Leaves all or nearly all opposite, seeds 5 or more.......... 1, 2, 3
Leaves all or many alternate: stems weak: seeds 4 or less.......... 4, 5

1. N. **maculata**, Benth. Corolla white with 5 violet spots.
2. N. **insignis**, Dougl. Leaves 7-13-lobed: corolla bright blue.
3. N. **Menziesii**, H. & A. Corolla blue to white, dark dotted in center.
4. N. **aurita**, Lindl. Leaves 2 to 4 in. long, lobes and prickles retrorse: limb violet.
5. N. **parviflora**, Dougl. Leaves variable: white, dotted corolla 2 to 6 lines long.

3. ELLISIA, Linnæus.

1. E. **membranacea**, Benth. Leaves 3-9-divided: lobes mostly entire.
2. E. **chrysanthemifolia**, Benth. Leaves twice or thrice pinnatifid.

4. DRAPERIA, Torrey.

1. D. **systyla**, Torr. Silky viscid: leaves opposite, entire: stamens unequal.

5. PHACELIA, Jussieu.

* *Leaves simple and entire or some of the lower ones with small entire lobes at the base.*

All simple and entire, narrow, the lower (and the branches) opposite.......... 1, 2
Mostly simple and entire, ovate or oblong: spikes long.......... 20
Simple and entire or with 2 or 3 slender basal lobes, narrow.......... 25
Often simple and entire but lower ones usually with 1 to 3 pairs of basal lobes, all lanceolate or ovate: veins simple, distinct. Ovules 4.......... 3, 4, 5
Ovules 8 or more.......... 28, 29, 30

* * *Leaves simple and more or less notched or lobed, or lower ones with small basal lobes, ovate or cordate.*

Hispid with spreading stinging hairs, annual.......... 6, 7
Hispid, viscid: leaves often pinnatifidly lobed.......... 21
Viscid: flowers large in loose racemes, blue, violet or white.
    Very viscid: style 2-parted.......... 14, 15
    Less viscid: style 2-cleft; corolla blue or violet.......... 16, 17
    Leaves doubly toothed or some pinnately parted.......... 18
    Leaves small, shorter than the petioles.......... 19
Lower leaves with small basal divisions.
    Leaves and flowers large, viscid.......... 22
    Leaves silky: somewhat hispid and glandular.......... 23

* * * *Leaves 1-3-pinnately divided and incised.*

Calyx not hispid, 2 lines long in fruit: seed mostly solitary.......... 8
Calyx hispid or ciliate: style 2-parted.......... 9, 10, 11, 12, 13

Style cleft to near the middle, leaves simply pinnate.

Tall perennial, soft pubescent; leaves large 24

Leaves with 7 to 15 entire or few-toothed obtuse lobes...................... 26

Leaves mostly at base: flowers on pedicels 6 to 12 lines long.............. 27

Style cleft at apex: corolla nearly tubular, 5 to 7 lines long............................ 31

§ 1. Euphacelia, *Gr.* *Ovules 4.*

1. **P. namatoides**, Gr. A span high: corolla blue, 1 or 2 lines long.
2. **P. Pringlei**, Gr. Taller: corolla more broadly campanulate. N. Cal.
3. **P. circinata**, Jacq. f. Hispid: grayish leaves strigose: spikes dense.

Var. calycosa, Gr. Calyx-lobes broader, veiny: stamens as much exserted.

4. **P. Breweri**, Gr. Similar but annual, smaller: hairless filaments not exserted.
5. **P. humilis**, T. & G. Diffuse: a span high: corolla deep blue, 2 or 3 lines long.
6. **P. malvæfolia**, Cham. Corolla white, 3 or 4 lines broad: stamens exserted.
7. **P. Rattani**, Gr. More slender: corolla 2 lines long: stamens included.
8. **P. platyloba**, Gr. Corolla nearly rotate, bluish, little exceeding calyx.
9. **P. distans**, Benth. Corolla dull-white to violet: stamens scarcely exserted.
10. **P. tanacetifolia**, Benth. Similar but stamens much exserted: capsule oval.
11. **P. hispida**, Gr. White-hispid: sepals very slender, much exceeding globose capsule.
12. **P. ramosissima**, Dougl. Perennial: stems weak: leaves rather coarsely lobed.
13. **P. ciliata**, Benth. Calyx much enlarged in fruit, lobes ovate, ciliate, veiny.

§ 2. Gymnobathus, *Gr.* *Ovules and seeds numerous: no appendages to rotate campanulate corolla.*

14. **P. viscida.** Torr. Corolla deep blue with lighter center, 6 to 12 lines broad.

Var. albiflora, Gr. Flowers white. With next species. Santa Barbara, S.

15. **P. grandiflora**, Gr. Similar: light blue to white corolla much larger.

§ 3. Whitlavia ,*Gr.* *Ovules 8 to many: flowers showy.*

16. **P. Whitlavia**, Gr. Corolla-tube cylindrical, spreading lobes much shorter.
17. **P. campanularia**, Gr. Corolla campanulate, 8 to 10 lines long. San Diego.
18. **P. Parryi**, Torr. Corolla cleft below the middle, violet, often 5 spots in throat.
19. **P. longipes**, Torr. Slender: corolla 5 or 6 lines long, white. Los Angeles, S.

§ 4. Eutoca, *Gr.* *Ovules 10 to many: capsule ovoid or oblong.*

20. **P. grisea**, Gr. Corolla whitish: filaments retrorsely hairy, exserted.
21. **P. loasæfolia**, Torr. Corolla 3 lines long: naked filaments much exserted.
22. **P. Bolanderi**, Gr. Corolla nearly rotate, 10 or 12 lines broad, violet to white.
23. **P. hydrophylloides**, Torr. Corolla 3 or 4 lines broad: naked filaments much exserted.

24. **P. procera,** Gr. Leaf-lobes acute: filaments much exserted.
25. **P. Menziesii,** Torr. Corolla violet or white, 6 to 10 lines broad.
26. **P. brachyloba,** Gr. Corolla small, whitish: stamens not exserted.
27. **P. Douglasii,** Torr. Diffuse: corolla campanulate, 5 to 10 lines broad.
28. **P. Davidsoni,** Gr. Hoary: leaves strigose: pedicels equaling calyx.
29. **P. circinatiformis,** Gr. Spikes dense: stamens included: seeds 6 or more.
30. **P. divaricata,** Gr. Corolla broadly campanulate, blue, 7 to 10 lines broad.

§ 5. **Microgenetes,** *Gr. Style cleft only at apex: stamens unequal, included.*

31. **P. bicolor,** Torr. Diffuse: racemes loose: corolla-tube yellowish. — Lakeport. June '93

6. EMMENANTHE, Bentham.

1. **E. parviflora,** Gr. Very viscid: corolla not exceeding calyx.
2. **E. penduliflora,** Benth. Less viscid: corolla exceeding calyx.

7. ROMANZOFFIA, Chamisso.

1. **R. Unalaskensis,** Cham. Calyx-lobes little shorter than the corolla.
2. **R. Sitchensis,** Bong. Pedicels, funnelform corolla and style longer.

8. HESPEROCHIRON, Watson.

1. **H. Californicus,** Wat. Corolla-lobes shorter than the tube.
2. **H. pumilus,** Porter. Corolla nearly rotate, tube bearded within.

9. NAMA, Linnæus.

1. **N. Lobbi,** Gr. Silky-woolly: leaves entire: flowers nearly sessile.
2. **N. Rothrockii,** Gr. Leaves almost pinnatifid: flowers in terminal heads.
3. **N. Parryi,** Gr. Cymes scorpioid: leaves linear, undulate, villous.

10. ERIODICTYON, Bentham.

1. **E. tomentosum,** Benth. Whitened or rusty with dense pubescence. S. Cal.
2. **E. glutinosum,** Benth. Sticky, resinous coated: corolla 6 lines long. Cal.

BORRAGINACEÆ.

§ 1. Ovary merely 4-lobed: stigma broad, sessile: glabrous: succulent.................. 1

§ 2. Ovary 4-parted into seed-like nutlets; style conspicuous; stigma small.

* *Nutlets fixed by the base to a flat receptacle, smooth and shining.*

Flowers leafy-bracted: corolla imbricated, yellow: soft-hairy.................. 2

Flowers bractless: corolla convolute, blue or white.......................... 3

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* * *Nutlets fixed to a prominent base (gynobase) by some part of the inner angle or face: corolla imbricated.*

Nutlets not armed with prickles, not appendaged.
  Corolla blue or whitish: smooth glaucous perennials.......... 4
  Corolla yellow: hispid annuals.......... 5
  Corolla white, mostly yellow-crested in the throat: hirsute or hispid.
    Nutlets erect and straight: calyx in fruit not rotate.......... 6
    Nutlets oblique or incurved on a rounded base.......... 7
  Corolla blue, rotate: a dwarf alpine tufted perennial.......... 8
Nutlets armed with hooked or barbed prickles, or flat and wing-margined.
  Corolla blue, purple or white; throat with a ring of 2-lobed crests.
    Racemes bracteate at base: nutlets erect, prickles barbed.......... 9
    Racemes on naked peduncles: nutlets globose.......... 10
  Corolla minute, white: flowers scattered along leafy branches.
    Nutlets flattened, forming an x-shaped or star-like bur.......... 11

1. HELIOTROPIUM, Tournefort.

1. **H. Curassavicum**, L. Nearly or quite prostrate: corolla bluish or white.

2. LITHOSPERMUM, Tournefort.

1. **L. Californicum**, Gr. Corolla 9 or 10 lines long: throat exceeding lobes.
2. **L. pilosum**, Nutt. Corolla greenish yellow, silky, 5 or 6 lines long.

3. MYOSOTIS, Linnæus.

1. **M. verna**, Nutt. Hispid calyx unequal: corolla white, small. Oregon.
2. **M. sylvatica**, Hoffm. var. alpestris, Koch. Corolla blue, 3 or 4 lines broad.

4. MERTENSIA, Roth.

1. **M. maritima**, Don. Corolla 3 or 4 lines long, tube shorter than calyx.
2. **M. Siberica**, Don. Corolla-tube much exserted: calyx lobes obtuse.

5. AMSINCKIA, Lehmann.

Nutlets sharply 3-angled, straight, smooth, shining.......... 1
Nutlets broad; the back nearly flat, wavy-wrinkled cross-wise.......... 2
Nutlets incurved, convex and ridged on the back, rough.......... 3, 4, 5

1. **A. vernicosa**, H. & A. Sparingly hispid: corolla-tube a little exserted.
Var. grandiflora, Gr. Very bristly-hispid: corolla-tube longer, limb broader.
2. **A. tessellata**, Gr. Coarsely hispid: leaves mostly obtuse: calyx rusty.
3. **A. intermedia**, F. & M. Calyx whitish or tawny hispid: corolla 2 or 3 lines.
4. **A. spectabilis**, F. & M. Corolla bright orange much exserted.

6. **A. lycopsoides**, Lehm. Stiff bristles with pimple-like base: leaf margins often undulate: often branching: very variable.

6. KRYNITZKIA, Fischer & Meyer.

§ 1. Nutlets ovoid, smooth, shining, a ridge down the back, a groove down the inner side, attached to the gynobase one quarter the length.......................... 1

§ 2. Nutlets ovoid, somewhat rugose, a ridge down the inner side, fixed by the base of the inner angle. Entire plant light green.

* *Mostly diffuse: lower leaves often opposite: corolla 1 or 2 lines broad*.............. 2, 3

* * *Flowers numerous: limb of corolla nearly rotate, 3 to 5 lines broad: yellow crests in the throat conspicuous: lower leaves mostly opposite* (*except in No. 6*)............ 4, 5, 6

§ 3. Nutlets never rugose; inner angle furrowed from less than half to all the way; back convex; side angles mostly obtuse, never margined: calyx in fruit erect or closed: corolla small, throat naked or the crests not exserted: numerous flowers sessile in scorpioid spikes.

* *Fruiting calyx often falling with the enclosed nutlets, these smooth, shining, acute: sepals narrow, hispid, slender.*

Nutlets solitary, rarely 2, acuminate, fixed below the middle................. 7, 8, 9
Nutlets usually all maturing scarcely a line long............................ 10, 11
Nutlets unequal, one much larger than the others................................ 12
Nutlets 3-angled-ovoid, papillose, sharply muricate or scabrous, attached nearly or quite up to the apex: usually erect and hispid; spikes bractless: calyx pungent-bristly.
Calyx very villous-hispid, in fruit 3-5 lines long, mid-rib strong.................... 13
Calyx 3 lines long or less; bristles pungent, whitish or yellowish.
    In fruit double the length of the nutlets not connivent.................. 14, 15
    In fruit 1 or 2 lines long, more or less connivent over the angular nutlets..16, 17, 18

* * *Fruiting calyx deciduous above a persistent basal cup: nutlets ovate-deltoid, 3-angled, usually very smooth, groove forked.*

Much branched, with flowers almost from base, hispid.......................... 19

1. **K. lithocarya**, Greene. Corolla not surpassing the rusty calyx: spike simple.
2. **K. Californica**, Gr. Leaves small, narrow: flowering from near the base.
Var. subglochidiata, Gr. Succulent: nutlets minute-bristly with barbed hairs.
3. **K. trachycarpa**, Gr. More lower leaves opposite: nutlets broader, granulate.
4. **K. Chorisiana**, Gr. Some pedicels 2 to 12 lines long: leaves large.
5. **K. Scouleri**, Gr. Slender: spikes often branching mostly bractless.
5. **K. mollis**, Gr. Perennial stems creeping, soft-hairy. Wet borders of ponds.
7. **K. sparsiflora**, Greene. Sepals with stiff hooked bristles: nutlet flattened.
8. **K. oxycarya**, Gr. Strigulose: leaves linear: calyx in fruit deflexed-bristly at base.
9. **K. microstachys**, Greene. Smaller, hispidulous: calyx bristles not deflexed.
10. **K. leiocarpa**, F. & M. Nutlets attached for nearly the whole length.
11. **K. Torreyana**, Gr. Nutlets attached half way up, groove forked.

Var. calycosa, Gr. Flowers crowded, somewhat capitate: calyx longer.
12. K. **dumetorum**, Greene. Almost climbing: papillose-hispid: 2 sepals united.
13. K. **barbigera**, Gr. Nutlets gray, very rough, rarely all fertile.
14. K. **intermedia**, Gr. Nutlets thickly muricate, groove with open basal scar.
15. K. **ambigua**, Gr. Nutlets minutely muricate, groove widely forked.
16. K. **muriculata**, Gr. Stout: spikes 2-3-radiate: nutlets triangular-ovate.
17. K. **Jonesii**, Gr. Slender: spikes more numerous, paniculate: calyx smaller.
18. K. **micromeres**, Gr. Hispid, diffuse: spikes filiform: flowers minute.
19. K. **micrantha**, Gr. var. lepida, Gr. Roots red: hispid: corolla 2½ lines long.

7. PLAGIOBOTHRYS, Fischer & Meyer.

* *Nutlets not on stipe-like attachments: calyx more or less villous with yellowish or rusty hairs, sometimes deciduous above the base (circumscissile).*
Sepals nearly distinct; in fruit 3 lines long, lax: nutlets broadly ovate............... 1
Calyx deeply 5-cleft: giving a violet stain to paper.......................... 2, 3, 4
Calyx cleft nearly to the base, 2-3 lines long in fruit not connivent................. 5
Calyx cleft half way, silky, in fruit connivent, soon circumscissile.................. 6
* * *Nutlets on stipe-like attachments: hispidulous*................................ 7
1. P. **rufescens**, F. & M. Stems slender from rosulate tuft of radical leaves.
2. P. **tenellus**, Gr. Radical leaves rosulate: nutlets 4-lobed or cross-like, shining.
3. P. **Shastensis**, Greene. Similar, with larger flowers and nutlets. Mt. Shasta.
4. P. **Torreyi**, Gr. Diffusely procumbent, hispidulous: leaves oblong.
5. P. **canescens**, Benth. Villous: spikes, as in the last, often leafy below.
6. P. **nothofulvus**, Gr. Rosulate leaves thin: corolla 2 or 3 lines broad.
7, P. **Cooperi**, Gr. Diffuse: corolla 2 or 3 lines broad, throat closed.

8. OMPHALODES, Tournefort.

1. O. **Howardi**, Gr. Silky, silvery: flowers few: corolla 4-5 lines broad. Or.

9. ECHINOSPERMUM, Lehmann.

Prickles of the fruit barbed at apex only: calyx in fruit reflexed.............. 1, 2, 3
Prickles barbed to the base: crests of small white corolla small....................... 4
1. E. **Californicum**, Gr. Corolla short-funnelform, blue, 2-6 lines broad.
2. E. **floribundum**, Lehm. Corolla rotate, blue or often white, 2-3 lines broad.
3. E. **diffusum**, Lehm. Similar corolla 4-9 lines broad: back of nutlet naked.
4. E. **Greenei**, Gr. Diffuse: nutlets triangular-ovoid: prickles terete. N. Cal.

10. CYNOGLOSSUM, Lehmann.

1. C. **occidentale**, Gr. Hispidulous: upper leaves sessile; lower, spatulate.
2. C. **grande**, Dougl. Soft-villous becoming glabrate: leaves all petioled.
Var. læve, Gr. Smooth: corolla smaller, lobes shorter than tube.

11. PECTOCARYA, De Candolle.

Nutlets forming an x-shaped bur, the wings undulate or laciniate................ 1, 2
Nutlets forming a flat +-shaped bur, the thin margins entire.................... 3, 4

1. **P. linearis**, DC. Wings of nutlets toothed, the teeth bristle-tipped.
2. **P. penicillata**, A. DC. More diffuse: nutlets fiddle-shaped; apex bristly.
3. **P. setosa**, Gr. Hispid, stouter: calyx-lobes with 3 or 4 very large bristles.
4. **P. pusilla**, Gr. Strigulose: nutlets angular, flat, wingless, with a midnerve.

CONVOLVULACEÆ.

Twining or trailing: corolla funnelform, large, limb entire: stigmas 2................. 1
Not twining: corolla 2-3 lines long, 5-cleft, white: styles 2.......................... 2
Corolla ½ in. long, 5-cleft, purplish: stigmas 2..........................Sp. 7 in No. 1
Twining leafless thread-like orange or yellowish stems: parasitic..................... 3

1. CONVOLVULUS, Linnæus.

Solitary flower with a pair of broad bracts enclosing the calyx.
  Stems very short and erect or prostrate, trailing (See var. No. 5)......... 1, 3, 4
  Stems twining freely: bracts cordate-ovate or sagittate (See 5)........................ 2
Flowers often 2-3 together with small bracts; stems often woody...................... 5
Flowers with a pair of subulate bracts at base of pedicel: stamens slender............ 6
Flowers 3 lines long, deeply 5-cleft: not twining.. 7

1. **C. Soldanella**, L. Glabrous, fleshy: leaves reniform: flowers pinkish.
2. **C. sepium**, L., **var. Americanus**, Gr. Leaves acute: corolla rose,
3. **C. Californicus**, Choisy. Short, erect, or at length prostrate; pubescent.
4. **C. villosus**, Gr. Densely white-velvety: leaves an inch long or less.

Var. fulcratus, Gr. Bracts similar to the leaves (hastate): corolla yellowish.

5. **C. occidentalis**, Gr. Bracts variable: stems often very long: corolla white.

Var. tenuissimus, Gr. Only a ft. or a yd. high: leaves slender-hastate.

6. **C. arvensis**, L. Creeping in moist places: corolla an inch long or less.
7. **C. pentapetaloides**, L. A diffusely branched slender annual with spatulate or lanceolate mostly entire leaves. This with No. 6 naturalized from Eu.

2. CRESSA, Linnæus.

1. **C. Cretica**, L. Gray silky leaves numerous, small, entire: flowers axillary.

3. CUSCUTA, Tournefort.

Ovary and capsule depressed globose: stamens low, very slender................. 1, 2
Ovary and capsule pointed; corolla withering-persistent: scales fringed.

Stems slender, low, growing on salt-marsh plants 3
Stems coarser: corolla much exceeding the calyx, 2½ to 4 lines long 4
Stems coarse: corolla lobes acute, usually inflexed 5, 6

1. C. **arvensis**, Beyrich. Flowers scarcely a line long in dense clusters.
2. C. **Californica**, Choisy. Calyx lobes acute: corolla lobes slender.
3. C. **salina**, Engelm. Delicate white flowers 1½-2½ lines long.
4. C. **subinclusa**, D. & H. Flower clusters globose, 6 to 12 lines thick.
5. C. **decora**, Choisy. Flowers fleshy and papillose: clusters close.
6. C. **racemosa**, Martius, var. **Chiliana**, Engelm. Corolla thin. From Chili.

SOLANACEÆ.

Corolla rotate: anthers connivent around the style: fruit a berry 1
Corolla rotate-campanulate: anthers not connivent: berry enclosed in the loose inflated calyx. May appear in cultivated ground. *Physalis.*
Corolla tubular-funnelform, ½ in. long or less: spiny shrubs 2
Corolla funnelform, large: fruit large, covered with spines 3
Corolla funnelform or tubular: capsule small, smooth 4
Corolla funnelform, 3-5-lines long: limb purple: stamens unequal 5

1. SOLANUM, Tournefort.

Corolla deeply 5-cleft, white or bluish: berries black or red 1, 2
Corolla only 5-angled or slightly lobed, violet or blue 3, 4

1. S. **nigrum**, L. Herbaceous: leaves mostly ovate, sinuate-toothed, acute.
2. S. **Douglasii**, Dunal. Woody-stemmed: flowers 5-8 lines broad, often bluish.
3. S. **Xanti**, Gr. Woody at base: hairs jointed: leaves mostly obtuse at base.
4. S. **umbelliferum**, Esch. More woody: hairs branched: leaf-base mostly narrow.

2. LYCIUM, Linnæus.

1. L. **Californicum**, Nutt. Leaves fleshy, 1-3 lines long: flower parts in 4's.
2. L. **Andersoni**, Gr. Leaves larger: flowers larger, 5-6 lines long. San Diego.

3. DATURA. Linnæus.

Calyx acutely 5-angled: fruit erect, ovoid 1, 2, 3
Fruit nodding, globose 4
Calyx scarcely angled: corolla 5 or 6 in. long: fruit nodding globose 5

1. D. **Stramonium**, L. Smooth: corolla white: lower prickles of capsule shorter.
2. D. **Tatula**, L. Similar: Stems usually purple: corolla pale violet.
3. D. **quercifolia**, HBK. Leaves sinuate pinnatifid: prickles unequal, flat.

4. D. **discolor,** Bernh. Corolla purplish: capsule and stout prickles pubescent.
5. D. **meteloides,** DC. Leaves entire or repand, one-sided: capsule large. S. Cal.

4. NICOTIANA, Tournefort.

Very viscid, ill-scented herbs: flowers soon closing in sunshine.
  Corolla salverform, the limb 4 or 6 lines broad.......................... 1, 2
  Corolla tubular-funnelform, white; stamens unequally inserted............ 3, 4
Very smooth glaucous shrub: corolla tubular, greenish yellow.................... 5

1. N. **Clevelandi,** Gr. Corolla greenish white, violet tinged, an inch long. S. Cal.
2. N. **attenuata,** Torr. Calyx shorter: corolla longer, limb white.
3. N. **Bigelovii,** Watson. Corolla 1-2 inches long, nearly as broad.
Var. **Wallacei,** Gr. Corolla smaller: leaves often nearly clasping. S. Cal.
4. N. **quadrivalis,** Pursh. Corolla broader than long: capsule globular. Or. E.
Var. **multivalis,** Gr. Corolla often 2 in. broad, 5-8-lobed: capsule large. Or.
5. N. **glauca,** Graham. Leaves long-petioled, subcordate. Naturalized. S. Cal.

5. PETUNIA, Juss.

1. P. **parviflora,** Juss. Spreading or prostrate on the sea shore.

SCROPHULARIACEÆ.

A. LEAVES all or all but the lower ones alternate, rarely all radical.

* *Leaves simple and entire (except in No. 1 and 16): corolla sometimes nearly regular, upper lip not beak-like.*

Corolla 5-lobed, rotate: stamens 5; filaments woolly.............................. 1
Corolla bilabiate, throat nearly closed: stamens 4.
  Base of corolla prolonged into a slender spur on lower side.................... 2
  Base of corolla swollen or saccate on lower side.............................. 3
Corolla large, open bilabiate with dentate lobes: stamens 2........................ 4
Corolla nearly regular: stamens 4: leaves narrow, mostly radical................... 14
Corolla large, campanulate-bilabiate, 4-lobed: stamens 4.......................... 15
Corolla and calyx 4-lobed: flowers small: stamens 2.
  Leaves cordate-orbicular, all radical, scapes slender........................ 16
  Leaves on the stem: corolla rotate, 4-lobed................................... 17

* * *Leaves or at least the bracts incisely lobed or pinnate: corolla tubular-bilabiate, closed; upper lip beak-like or compressed on the sides.*

Leaves or lobes not serrate: anther cells unequal or only one.
  Upper corolla-lip much surpassing the 3-toothed obscure lower lip............ 18
  Upper lip erect, much smaller than the 3-saccate, 3-toothed lower lip........ 19
  Lips of club-shaped corolla nearly equal: calyx 1-3-leaved................... 20

Leaves or lobes serrate: anthers equally 2-celled.
Upper lip or its beak exceeding the 3-toothed lower lip (except sp. 7)......... 21

B. LEAVES all opposite or whorled (rarely alternate above in No. 9).

* *Stamens 4 with anthers; sterile filament often rudimentary or none.*

Corolla declined: stamens and style infolded by lower lip........................... 5
Corolla small, lobes spreading: upper leaves 3-lobed or parted........................ 6
Corolla erect, front lobe reflexed: scale in throat on upper side...................... 7
Corolla etc. as in No. 9, but the seeds winged: odor rank.............................. 8
Corolla open: sterile filament conspicuous: stigma entire............................... 9
Corolla-throat open or closed: no sterile filament: calyx 5-angled (except 1 sp.)....... 10
Corolla blue or white, tube short, lips spreading, the upper emarginate.............. 11

* * *Stamens 2 with anthers: flowers small: growing in wet ground.*

Calyx 5-parted into narrow, nearly equal divisions: corolla bilabiate.
Sterile filaments simple or none: corolla small, whitish........................ 12
Sterile filaments forked: corolla violet or bluish.................................. 13
Calyx 4-parted: corolla rotate, 4-lobed.. 17

1. VERBASCUM, Linnæus.

1. **V. Thapsus,** L. Densely velvety-woolly, leaves decurrent: corolla yellow.
2. **V. virgatum,** With. Slender, green: filaments violet bearded or woolly.
3. **V. Blattaria,** L. Similar but pedicels solitary and longer than calyx.

2. LINARIA, Tournefort.

1. **L. Canadensis,** Dumont. Straight, smooth: leaves narrow: flowers blue.

3. ANTIRRHINUM, Tournefort.

* *Erect, 2 to 7 ft. high, leafy: flowers in a dense spike, light rose color: filaments broadest at the top.*

Lakeport June '95
Stems many from a perennial base, simple, glabrous, light green 1
Stem stout, branching, very viscid-pubescent, 3-5 ft. high............................ 2

* * *Branching with filiform axillary branchlets which coil around objects: sepals unequal.*

Flowers in a more or less villous-viscid spike: bracts minute 5, 6, 7
Flowers scattered along the stem and slender branches.
Leaves on the main stem, ovate or subcordate.. 8, 9
Leaves on main stem mostly narrow: corolla purple.......................... 10, 11

* * * * *Erect, nearly simple stems: peduncles slender, twisting around objects*.......... 12

1. **A. virga,** Gr. Deflexed lower lip of corolla upward inflexed from middle. 9 ft.
2. **A. glandulosum,** Lindley. Corolla with yellowish palate. Monterey S.
3. **A. cornutum,** Benth. Filaments all broadest at top. Sac. Val., rare.
4. **A. leptaleum,** Gr. Leaves rarely linear: style shorter than pod. Sac. Valley S.

5. **A. Coulterianum**, Benth. Leaves linear to oval, distinct: spike dense.
6. **A. Orcuttianum**, Gr. More slender: spike loose: corolla smaller, 4 lines long.
7. **A. Nevinianum**, Gr. Similar, but seeds ribbed not honeycomb-pitted.
8. **A. subcordatum**, Gr. Leaves sessile, each subtending a flower and branchlet.
9. **A. Nuttalianum**, Benth. Leaves petioled: pedicels often long as violet corolla.
10. **A. vagans**, Gr. Very diffuse: broad upper sepal equaling corolla-tube.

Var. Bolanderi, Gr. Leaves orbicular on branchlets: upper sepal broader.

11. **A. Breweri**, Gr. Similar: slender corolla-tube exceeding upper sepal. N. Cal.
12. **A. strictum**, Gr. Corolla violet-purple, palate hairy. Santa Barbara.

4. MOHAVEA, Gray.

1. **M. viscida**, Gr. Very viscid: lower leaves opposite: corolla yellow, purple dotted.

5. COLLINSIA, Nuttall.

* *Flowers on short pedicels or sessile in axillary whorls, 6-8 lines long.*

Corolla strongly declined, the throat as broad as long, nearly or quite at right angles with the short tube: gland sessile.. 1, 2

Corolla less declined, throat narrower, leaves obtuse......................... 3, 4, 5

* * *Flowers but little longer or not as long as the pedicels.*

Corolla usually more than 5 lines long, strongly declined sepals acute.......... 6, 7, 8

Corolla mostly less than 4 lines long: lips nearly equal: stems slender.......... 9 to 12

1. **C. bicolor**, Benth. Upper corolla lip recurved, paler than the violet lower lip.
2. **C. tinctoria**, Hartweg. Stains brown: corolla purple-striped, upper lip very short.
3. **C. bartsiæfolia**, Benth. Leaves crenate, obtuse: calyx often white-hairy.
4. **C. corymbosa**, Herder. Branching: flower clusters nearly capitate. N. Cal C'st.
5. **C. Greenei**, Gr. Corolla rich violet or lavender; upper lip short; side lobes small.
6. **C. grandiflora**, Dougl. Flowers in whorls of 3 to 9: lower lip deep blue or violet.

Var. pusilla, Gr. Small form: corolla only 4 or 5 lines long, deeply colored.

7. **C. sparsiflora**, F. & M. Slender: only upper flowers in 3's, ⅛-⅔ in. long.

Var. divaricata. Only 2 or 3 in. high: flowers smaller, solitary. S. F. Bay.

8. **C. linearis**, Gr. Paniculately branched: leaves very slender: pale corolla dark-dotted. N. Cal.
9. **C. parviflora**, Dougl. Often diffuse: corolla little exserted, 2 or 3 lines long.
10. **C. Rattani**, Gr. Stem strict, mostly simple: corolla lips violet, 1-2 lines long.
11. **C. Childii**, Parry. Stem similar: corolla light blue. In forests S. Cal.
12. **C. Torreyi**, Gr. Much branched: flowers in 3's and 6's, blue or violet.

6. TONELLA, Nuttall.

1. **T. collinsioides**, Nutt. Diffuse: flowers on slender pedicels, a line long.

7. SCROPHULARIA, Tournefort.

1. **S. Californica, Cham.** Stems square: flowers dull purple, 3-4 lines long.

8. CHELONE, Linnæus.

1. **C. nemorosa, Dougl.** Corolla violet-purple. In woods, Or., northward.

9. PENTSTEMON, Mitchell.

§ 1. Anther-cells soon widely separating at base, united more or less completely at top, splitting open nearly or quite the whole length.

* *Anthers densely woolly, becoming shield-shaped after shedding pollen* 1

* * *Anthers glabrous, splitting through the apex and spreading out: stems branching and shrubby, at least below: leaves leathery or parchment-like, mostly small, and short-petioled: filaments all hairy at base.*

Corolla scarlet, narrow-tubular, its upper lip erect and the lower more or less spreading: sterile filament bearded down one side.

Leaves subcordate or ovate acutely toothed, 1 in. long or less 2
Leaves oblong or oval ½ to 2 in. long, often canescent 3
Leaves slender, rigid, acutely toothed, glaucous 4

Corolla yellow or yellowish, purple-tinged, not an inch long, the gaping limb longer than the tube (except No. 7): upper lip concave, lower recurved.

Leaves lanceolate or oblong-lanceolate, denticulate 5
Leaves similar, yellowish green, remotely serrate 6
Leaves spatulate or oval, entire, 6 lines long or less 7

* * * *Anthers with spreading distinct cells splitting from base nearly to the top: corolla scarcely bilabiate, blue or purple.*

Leaves mostly oblong-lanceolate, glaucous 8

* * * * *Anthers splitting open from base through the united apex.*

Glaucous or pale and glabrous: leaves leathery or thick: corolla 9-12 lines long.

Stems thick, 1 to 3 ft. high: leaves mostly ovate-lanceolate, entire 9
Taller: leaves thinner; upper pairs acuminate, united, acutely dentate 10
Similar but leaves thicker: corolla crimson, 9 lines long, throat narrow 11
Leaves 1½ to 4 in. long, the upper often united: corolla cream-white, pinkish .. 12

Corolla 8 lines long or less (more in 13): thyrsus viscid in 13, 14, 16, 18.

Corolla somewhat bilabiate lower lip and sterile filament hairy... 13, 14, 15, 16
Corolla funnelform or tubular: sterile filament nearly or quite naked...... 17, 18

§ 2. Anthers sagittate or horse-shoe shaped, the cells opening by a continuous cleft around the apex which reaches about half way to the bases of the cells, these remaining closed and saccate, sometimes hairy but never woolly: corolla some shade of purple and blue, from rose purple to lavender (scarlet red in the last).

* *Soft-pubescent, viscid, stout: radical leaves 6-8 inches long* 19

* * *Glabrous, or inflorescense puberulent or viscid: leaves toothed or pinnatifid: sterile filament hairy: corolla funnelform, moderately bilibiate.*

Corolla over an inch long, lobes and all the stamens sparsely hairy.................. 20
Corolla an inch long or usually less 21, 22, 23

* * * *Glabrous or puberlent: leaves all entire.*

Corolla 6 lines long, slender: sterile filaments bearded................................ 24
Corolla short bilabiate, 8 to 18 lines long: sterile filament naked.
    Calyx glandular or viscid: leaves lanceolate to spatulate................. 25, 26
    Calyx not glandular or viscid: thyrsus usually narrow............... 27, 28, 29

1. **P. Menziesii**, Hooker. Leaves 3-12 lines long: corolla violet to pink. Cal. N.
Var. **Newberryi**, Gr. Corolla rose-purple or pink. Southern Sierras.
2. **P. cordifolius**, Benth. Climbing over bushes, very leafy. San Luis Obispo. S.
3. **P. corymbosus**, Benth. Erect, 1 or 2 ft. high, leafy: cyme corymbose.
4. **P. ternatus**, Torr. Branches slender: upper leaves in 3's. Kern Co. S.
5. **P. breviflorus**, Lindl. Sterile filament naked. Sierra Nevada.
6. **P. Lemmoni**, Gr. Paniculate: sterile filament yellow bearded. N. Cent. Cal.
7. **P. antirrhinoides**, Benth. Branched, leafy, paniculate: corolla pale yellow.
8. **P. glaber**, Pursh. Wide corolla 1 to 1½ in. long. Sierras eastward.
9. **P. centranthifolius**, Benth. Very glaucous: corolla tubular, bright scarlet.
10. **P. spectabilis**, Thurber. Corolla rose-purple or lilac, the limb violet.
11. **P. Clevelandi**, Gr. Corolla crimson, 9 lines long: sterile filaments bearded.
12. **P. Palmeri**, Gr. Corolla 8-9 lines broad: sterile fil. densely yellow-bearded.
13. **P. Rattani**, Gr. Leaves 3-8 in. long, denticulate: corolla pale purple. N. W. Ca.
Var. **minor**, Gr. Smaller: corolla 6-7 lines long. Klamath and Trinity R.
Var. **Kleei**, Gr. Between the foregoing in size. High peak near Santa Cruz.
14. **P. pruinosus**, Dougl. Pubescent: corolla deep blue, hairy. Or. Wash.
15. **P. ovatus**, Dougl. Pubescent: leaves ovate, serrate, green: corolla purple blue.
16. **P. confertus**, Dougl. Thyrsus in 2-5 dense whorls: corolla yellowish, small.
17. **P. deustus**, Dougl. Tufted, woody at base: corolla yellow to dull white.
18. **P. heterodoxus**, Gr. Leaves obtuse, entire. Near Donner Pass, Cal.
19. **P. glandulosus**, Lindl. Corolla lilac: sterile filaments naked. Or. Wash.
20. **P. venustus**, Dougl. Leaves closely serrate: sepals small. Or.
21. **P. diffusus**, Dougl. Often diffuse: leaves unequally serrate. Or. Wash.
22. **P. Richardsoni**, Dougl. Leaves incised or laciniate-pinnatifid. Or.
23. **P. triphyllus**, Dougl. Leaves lonceolate or linear, rigid, often laciniate.
24. **P. gracilentus**, Gr. Peduncles and calyx viscid. Mts. N. Cal., Or.
25. **P. lætus**, Gr. Ashy-pubescent: corolla an inch long blue. Mts. Cal.
26. **P. Roezli**, Regel. Smaller: corolla smaller, paler. Sierra Nev. to Or.
27. **P. azureus**, Benth. Glaucous; leaves ovate or narrower: corolla broad.
Var. **Jaffrayanus**, Gr. Low broad-leaved form in the Sierras.
Var. **parvulus**, Gr. Broad leaves an inch or less long: corolla 9 lines long. Alpine.

Var. angustissimus, Gr. Leaves very slender. Yosemite Valley, etc.

28. P. **heterophyllus**, Lindl. Similar: buds often yellowish. W. Cal.

29. P. **Bridgesii**, Gr. Thyrsus one-sided: corolla lips long. S. Sierras.

10. MIMULUS, Linnæus.

* *Corolla buff, salmon-color or orange, large: a viscid shrub.* 1

* * *Corolla-limb rose or crimson-purple (scarlet in No. 17): sticky viscid or slimy (less so in 8, 10, 17, 18, 38); often ill scented.*

a. Style pubescent above; stigma unequally lobed or entire, usually peltate-funnelform: flowers sessile or nearly so.

Corolla-tube long, slender; lower lip very short; upper lip erect.................... 5
Corolla scarcely exserted, 3-4 lines long: capsule much exserted.................... 6
Corolla exceeding ½ inch; lower lip shorter; throat dark or yellow.................... 8
Corolla trumpet shape, 6-9 lines broad, crimson: calyx hardly oblique.............. 10
Corolla similar, 6 lines long, 4-5 lines broad, deep red: calyx oblique................ 11
Corolla nearly funnelform, 2-6 lines long, crimson: calyx-teeth spreading............ 12
Corolla 6-9 lines long: calyx-teeth obtuse, nearly equal............................. 13
Corolla often an inch long: calyx-teeth very unequal, acute: very viscid............ 14
Corolla oblique-salverform, white, crimson-veined.................................. 16

b. Style smooth; stigma of 2 equal flat lobes which upon irritation close: flowers on long or short peduncles.

Corolla oblique-bilabiate, exceeding 1 inch, lobes reflexed, scarlet.................. 17
Corolla open-bilabiate, 1½-2 inches long, lobes spreading, rose-color................. 18
Corolla little surpassing calyx; very slimy-villous.................................. 34
Corolla 2-3 lines long; lower lip entire, upper 2 lobed............................. 38

* * * *Corolla-limb rose or crimson-purple: not viscid, or very slightly so.*

a. Almost stemless: corolla-tube long and slender: style pubescent.

Flowers erect, sessile, surpassing the leaves, 1-2 inches long................... 2, 3, 4

b. Stems much longer than the flowers: style smooth; stigma equally 2-lobed, lobes flat and often closed.. 18, 30, 38, 39

* * * * *Corolla yellow, often spotted: viscid or slimy.*

Corolla-throat often purple-tinged or dotted: odor strong, fetid...................... 7
Corolla 1 inch long or longer, nearly as broad, lobes subequal...................... 15
Corolla 3-9 lines long: peduncles scape-like: leaves rosulate-crowded................ 19
Corolla ¾-1 inch long: slimy, musky, spreading and creeping......................... 20
Corolla ½-¾ inch long: fruiting calyx ½ inch long, mouth closed...................... 27
Corolla ¼-½ inch long: fruiting calyx on long peduncle, lower teeth shortest......... 29
Corolla light yellow, limb often pinkish: petioles margined......................... 31
Corolla as broad as long (½ inch): peduncles much exceeding oval leaves............. 32
Corolla narrower, ¼-½ inch long: peduncles little exceeding the leaves............... 33

Corolla-tube narrow, exserted; throat and bearded lip spotted.................... 36
Corolla 3-4 lines long, lobes nearly equal, often a pair of spots.................... 40

* * * * * *Corolla yellow, often spotted, not viscid.*

Leaves ovate to oblong: rootstocks tuber-bearing: corolla ½ inch broad.............. 21
Leaves similar, coarsely serrate, acute: corolla orange-yellow, 1 inch broad.......... 22
Lower leaves broad, acutely and irregularly dentate or laciniate.................... 23
Lower leaves narrow, petioled, thick, shining, denticulate, small.................... 24
Lower leaves clasping, the others orbicular-perfoliate, glaucous.................... 25
Leaves mostly basal: stem wing-angled: upper calyx-tooth prominent.............. 26
Leaves very small, often purplish: diffuse: peduncles spreading.................... 27
Leaves narrow, laciniately lobed: corolla pale, 2-4 lines long: diffuse.............. 28
Leaves narrow, entire: corolla ½ in. broad, purple dotted; lip bearded.............. 36
Leaves narrow, entire: corolla 2-3 lines long: lobes all notched.................... 37
Leaves entire, soft-hairy: diffuse: corolla with 2 brownish spots.................... 40

* * * * * * *Corolla white or white and yellow, often purple-marked.*

White or yellowish, throat with 8 or 10 purple stripes.................... 9
White purple or yellowish, 3-6 lines long: calyx-teeth very short.................... 30
White, veined with crimson, oblique salverform.................... 16
Yellow with white or pinkish border, ½ in. long: viscidulous.................... 31
Upper lip white, lower yellow, purple dotted: viscid.................... 35

§ 1. **DIPLACUS**, Gr. Shrubs 3-5 ft. high: glutinous-viscid.

1. **M. glutinosus**, Wendl. Variable. Common in Central and W. Cal.

§ 2. **ŒNOE**, Gr. Corolla 1-2 in. long; tube long exserted, slender: capsule 1-sided.

2. **M. tricolor**, Lindl. Corolla limb with 5 crimson spots, palate yellow.
3. **M. angustatus**, Gr. Similar: corolla tube 3-8 times as long as the short throat.
4. **M. Douglasii**, Gr. Upper corolla lip erect, lower almost none: stemless.
5. **M. Kelloggii**, Curran. Becoming a span or a ft. high: lower lip larger. Cal.

§ 3. **EUNANUS**, Gr. Style glandular: capsule not 1-sided.

6. **M. Rattani**, Gr. A span high: calyx very viscid. Mt. Tamalpais and Lake Co., Cal.
7. **M. mephiticus**, Greene. Corolla 6-8 lines long. Sierra Nevada.
8. **M. nanus**, H. & A. A span high or less, blossoming from near base. Cal., N.
9. **M, Whitneyi**, Gr. Dwarf, 1 or 2 in. high: corolla ½ in. long. Alpine, Cal.
10. **M. Fremonti**, Gr. Leaves narrow: corolla rarely white. Common in S. Cal.
11. **M. subsecundus**, Gr. Diffuse: flowers spicate, turned to one side. Cal.
12. **M. leptaleus**, Gr. A span or less high, often depauperate. Mts., Cal.
13. **M. Torreyi**, Gr. A span or more high, simple or branching. S. N. Mts.
14. **M. Bolanderi**, Gr. Very viscid, strong scented, 1-3 ft. high, simple. Cent. Cal.

15. **M. brevipes**, Benth. Very viscid, 1-2 ft. high: leaves slender. Monterey, S.

§ 4. **MIMULASTRUM**, Gr. Corolla throat contracted at mouth: limb rotate.

16. **M. pictus**, Gr. Simple stems or basal branches erect. Tehachapi, Cal.

§ 5. **EUMIMULUS**, Gr. Calyx plicately angled: style smooth; stigma-lobes flat.

17. **M. cardinalis**, Dougl. Viscid-villous, 2-4 ft. high: leaves ovate, erose.
18. **M. Lewisii**, Pursh. More slender, greener. Subalpine. Cal.–Or.
19. **M. primuloides**, Benth. Scapes 1-4 in. long: light green. S. N. Mts.
20. **M. moschatus**, Dougl. Stems 1-3 ft. long: leaves oblong-ovate, 1-2 in. long.
Var. longiflorus, Gr. Less viscid, corolla longer.
Var. sessilifolius, Gr. Leaves sessile: corolla 1 in. long. *M. inodorous*, Greene.
21. **M. moniliformis**, Greene. Leaves sparingly denticulate. S. N. Mts.
22. **M. dentatus**, Nutt, Simple stems a foot high or less. Humboldt Bay, N.
23. **M. luteus**, L. Erect, ½ to 4 ft. high: corolla large; palate prominent.
24. **M. Scouleri**, Hook. Erect, 1-2 ft. high: flowers smaller. Columbia R.
25. **M. glaucescens**, Greene. Corolla 1 in. long and broad, not dotted. S. N. Mts.
26. **M. nasutus**, Greene. Corolla short, often with a spot. Common.
27. **M. nudatus**, Curran. Corolla ½-¾ in. long, deep yellow. Cal.
28. **M. laciniatus**, Gr. Slender: ½-1 ft. high. Merced R., Cal.
29. **M. alsinoides**, Dougl. Slender, branching, 3-12 in. high. Moist rocks.
30. **M. inconspicuus**, Gr. Leaves ovate or narrower, entire, ½ in. long or less.
Var. acutidens, Gr. Calyx-teeth subulate: leaves denticulate. King's R.
Var. latidens, Gr. Calyx-teeth triangular ovate. Monte Diablo, S.
31. **M. Pulsiferæ**, Gr. Branching, 6-8 in. high: leaves 3-nerved. N. Cal. to W.
32. **M. peduncularis**, Dougl. Erect, slender: leaves ¼-½ in. long. Columbia R.
33. **M. floribundus**, Dougl. Similar, slimy, musky. Common.
34. **M. Parishii**, Greene. Stout, erect, 1-2 ft. high, leafy. Los Angeles, S.
35. **M. bicolor**, Hartweg. Leaves small: calyx ribbed. Foot-hills, S. N. Mts.
36. **M. montioides**, Gr. Branching from base or simple: leaves slender. S. N. Mts.
37. **M. Suksdorfii**, Gr. Leaves often reddish, ¼-½ in. long. Cascade and S. N. Nts.
38. **M. rubellus**, Gr. Leaves lanceolate, ½-1½ in. long. Cascade and S. N. Mts.
39. **M. Palmeri**, Gr. Leaves narrow: corolla-limb nearly rotate. S. E. Cal.
Var. androsaceus, Gr. *M. androsaceus*, Curran. Much branched: leaves broader: corolla smaller, 3-6 lines long. S. E. Cal.

§ 6. **MIMULOIDES**, Gr. Calyx deeply cleft, almost nerveless.

40. **M. exilis**, Durand. *M. pilosus*, Watson. Much branched, leafy, very floriferous. Common in Cal.

11. HERPESTIS, C. T. Gærtner.

1. **H. rotundifolia**, Pursh. Creeping in wet places: leaves obovate. Fresno, Cal.

12. GRATIOLA, Linnæus.

1. **G. ebracteata**, Benth. Leaves lanceolate: sepals equaling corolla.
2. **G. Virginiana**, L. More viscid: leaves broader: calyx much shorter.

13. ILYSANTHES, Rafinesque.

1. **I. gratioloides**, Benth. Diffuse: leaves ovate or oblong: corolla ¼ in. long.

14. LIMOSELLA, Linnæus.

1. **L. aquatica**, L. Tufts 1-2 in. high: leaves fleshy, slender: semi-aquatic.

15. DIGITALIS, Linnæus.

1. **D. purpurea**, L. Tall stems with terminal spike of rose or white flowers mostly spotted. The common *Foxglove* now naturalized. Humboldt Bay to Or.

16. SYNTHYRIS, Bentham.

1. **S. rotundifolia**; Gr. Scapes naked 3-4 in. high, not exceeding leaves. Or.
Var. cordata, Gr. Leaves smaller, cordate, simply crenate. N. W. Cal.
2. **S. reniformis**, Benth. Scapes bracteate, surpassing leaves, pedicels shorter. Or.

17. VERONICA, Linnæus.

* *Perennials subaquatic: racemes in the axils of opposite leaves: corolla blue.*

1. **V. Anagallis**, L. Leaves sessile oblong-lanceolate, subclasping.
2. **V. Americana**, Schweinitz. Leaves often petioled, broader. Common.
3. **V. scutellata**, L. Slender: leaves sessile, linear or lanceolate, acute.

* * *Perennials: racemes terminal: leaves broad, an inch long or less.*

4. **V. Cusickii**, Gr. Stems erect 3-4 in. high, leafy: naked peduncle 3-9-flowered.
5. **V. alpina**, L. Not so leafy: racemes dense: corolla smaller, 2-3 lines broad.
6. **V. serpyllifolia**, L. Stems creeping and branching: spike-like raceme leafy.

* * * *Lower annuals: flowers in the axils of mostly alternate leaves.*

7. **V. peregrina**, L. Nearly glabrous, erect, branching: flowers small.
8. **V. arvensis**, L. Pubescent, soon spreading: lower leaves crenate.
9. **V. Buxbaumii**, Tenore. Very pubescent decumbent; pedicels long. S. F. Bay.

18. CASTILLEIA, Mutis.

Leaves and bracts all linear-lanceolate and entire: calyx all green. 1
Leaves mostly entire, narrow: calyx deeper cleft before than behind, mostly red: corolla 1½-2 in. long; upper lip (galea) ¾-1 in. long.................................... 2, 3

Calyx about equally cleft before and behind: floral bracts more or less dilated, red varying to yellow or whitish.

Galea (upper lip) as long or longer than the tube, lip very short....... 4, 5, 6
Galea hardly as long as tube: leaves linear, entire, white-woolly.............. 7
Galea much shorter than tube, about twice as long as the lip............ 8, 9

1. C. **stenantha,** Gr. Slender: corolla 1-1½ in. long. Cent. to S. Cal.
2. C. **affinis,** H. & A. Calyx cleft twice as deep before as behind. Cal. Coast.
3. C. **linearifolia,** Gr. Calyx cleft much deeper before. S. N. Mts.
4. C. **latifolia,** H. & A. Diffuse, viscid-villous: leaves broad, obtuse. Cal.
5. C. **parviflora,** Bong. Leaves laciniate-cleft or entire: galea partly exserted.
6. C. **miniata,** Dougl. Leaves and bracts mostly entire: galea more exserted.
7. C. **foliolosa,** H. & A. Many stems from woody base leaves crowded. Cal. Coast
8. C. **pallida,** Benth, var. occidentalis, Gr. Flowers whitish: low: alpine.
9. C. **Lemmoni,** Gr. Taller: spike dense, reddish. Sierra Co., Cal.

19. ORTHOCARPUS, Nuttall.

§ 1. **Castilleoides,** Gr. Lip of the corolla simply or somewhat triply saccate the lobes (teeth) erect: anthers all 2-celled: bracts with colored tips.

Perennial: very leafy: leaves mostly 3-5-parted: galea obtuse.......................... 1
Annual (as are all the remaining species): galea nearly straight................ 2, 3, 4
Galea densely bearded, incurved at apex: filaments hairy........................... 5

§ 2. Corolla-lip simply saccate; teeth inconspicuous or wanting: galea ovate-triangular: anthers 2-celled.

Bracts colored, dilated: corolla rose-purple................................ 6, 7
Bracts not colored, leaf-like, 3-5-cleft, lobes acute.............................. 8, 9

§ 3. **Triphysaria,** Benth. Corolla-lip conspicuously 3-saccate, teeth minute or small; tube slender: bracts all similar to the leaves.

Slender, diffusely spreading: minute flowers in nearly all the axils.................. 10
Stems erect, often corymbosely or fastigiately branched.
Stamens soon exserted: spikes of yellowish or white flowers dense............. 11
Stamens included; anthers 1-celled: leaf divisions filiform................ 12, 13
Stamens included; anthers 2-celled but lower cell often imperfect......... 14, 15
Stamens included; anthers 2-celled: stems strict, often simple.
Very leafy and hirsute above: spike very dense; bracts broad........... 16
Spikes leafy: corolla yellow; sacs 2 lines long: viscid..................... 17
corolla white sacs 1-2 lines deep..................... 18, 19

1. O. **pilosus,** Watson. Sierra Nevada above 5000 ft. to Mts. of Oregon.
2. O. **attenuatus,** Gr. Slender: spike of pale flowers very slender. Coast.
3. O. **densiflorus,** Benth. Spikes dense: leaves entire or few-lobed. Cal.
4. O. **castilleioides,** Benth. Spikes shorter: leaves mostly laciniate. Coast.

5. O. **purpurascens**, Benth. Crimson or rose-color spikes showy. Cal.
6. O. **imbricatus**, Torr. Slender: cor. hardly ½ inch long. S. N. and Cascade Mts.
7. O. **pachystachyus**, Gr. Low, stout: cor. over 1 inch long, galea hooked. N. Cal.
8. O. **bracteosus**, Benth. Hirsute, strict: corolla rose-purple. Br. Col. to Cal.
9. O. **luteus**, Nutt. Corolla golden yellow: galea obtuse straight. S. N. Mts.
10. O. **pusillus**, Benth. Leaves 3-5-parted into filiform lobes, often brownish.
11. O. **floribundus**, Benth. Erect 3-8 in. high: corolla ½ in. long. S. F. Bay.
12. O. **erianthus**, Benth. Corolla sulphur-yellow; galea dark. Cal. Coast.
Var. **lævis**, Gr. Often a foot high: corolla yellow to white: galea pale.
Var. **roseus**, Gr. Corolla larger, white or rose-color. San Francisco.
13. O. **Bidwelliæ**, Gr. Similar: smaller in every way. Sacramento Valley.
Var. **micranthus**, Gr. Still smaller: lip a line broad. Fresno Co., Cal.
14. O. **gracilis**, Benth. Bracts with purplish tips: corolla purplish. Rare.
15. O. **campestris**, Benth. 2-4 in. high: leaves mostly entire: corolla white.
16. O. **lithospermoides**, Benth. Corolla yellow or rose-tinged, large.
17. O. **lacerus**, Benth. Hairy leaves and bracts 3-7-cleft. S. N. Mts. and Sac. Val.
18. O. **hispidus**, Benth. Soft-hairy: spike slender. Or. and Cal.
19. O. **linearilobus**, Benth. Hirsute, stouter, more branched. Cent. Cal.

20. CORDYLANTHUS, Nuttall.

* *Calyx 2-leaved: flowers short-peduncled or sessile subtended by 2-4 bractlets: stamens 4; filaments hairy: corolla nearly included.*

Leaves mostly 3-5-parted, the upper and bracts hispid-ciliate........................ 1
Leaves entire except the 3-parted bracts: soft villous.............................. 2
Leaves entire very slender; bracts obtusely 3-5-lobed, fan-shaped.................. .. 3
Leaves entire very slender: flowers scattered on slender branches.................... 4

* * *Calyx of one posterior leaf: flowers in short spikes, sessile in the axils of clasping bracts: no bractlets: low salt-marsh plants*.................................... 5, 6

1. C. **filifolius**. Nutt. Corolla over ½ in. long, purplish. Cal.
2. C. **pilosus**, Gr. Tall: viscidulous flowers few in clusters or solitary.
Var. **Bolanderi**, Gr. Lower, more viscid: flowers all scattered.
3. C. **Pringlei**, Gr. Corolla 4-5 lines long, pale yellow. Clear Lake, Cal.
4. C. **tenuis**, Gr. Paniculate, 1-2 ft. high. Central Cal.
5. C. **mollis**, Gr. Stamens 2: anthers 2-celled. S. F. Bay.
6. C. **maritimus**, Nutt. Stamens 4. San Diego to Humboldt Bay.

21. PEDICULARIS, Tournefort.

Galea with a slender projecting or upturned beak: corolla dull rose or crimson: spike naked. Alpine in S. N. Mts.. 1, 2
Galea with incurved beak: corolla white or whitish.......................... 3, 4, 5
Galea falcate with subulate beak: a pair of stem leaves.............................. 6

Galea not beaked: leaves pinnately-parted, lobes pinnatifid.................... 7, 8, 9

1. P. **Grœnlandica**, Retz. Spike glabrous: corolla ¼ in. and beak ½ in. long.
2. P. **attollens**, Gr. Spike woolly; beak of galea 2-3 lines long.
3. P. **contorta**, Benth. Leaves pinnate, linear lobes incised. Or.
4. P. **racemosa**, Dougl. Leaves undivided, crenate: raceme leafy. Subalpine.
5. P. **Howellii**, Gr. Leaves entire, serrate or pinnate, Siskiyou Mts.
6. P. **ornithorhyncha**, Benth. Spike interrupted: calyx inflated. Mt. Tacoma.
7. P. **palustris**, L. (Var.) Calyx 2-cleft: corolla ½ in. long, purplish.
8. P. **Semibarbata**, Gr. Nearly stemless: spikes sessile. Mts. Cal.
9. P. **densiflora**, Benth. Corolla scarlet or crimson; galea ½ in long.

OROBANCHACEÆ.

1. APHYLLON, Mitchell.

Scapes or long peduncles from a scaly, fleshy rootstock or short stem............. 2, 1

Stems rising above ground: pedicels shorter than the flower or none.

Flowers an inch or more long on distinct pedicels.......................... 3, 4

Flowers nearly sessile, about ½ in. long: anthers glabrous.................. 4, 5

1. A. **uniflorum**, Gr. Scapes few: corolla often violet tinged: calyx lobes slender.
2. A. **fasciculatum**, Gr. Peduncles often many: corolla yellow: calyx lobes short.
3. A. **comosum**, Gr. Calyx-lobes half as long as pink or purple corolla.
4. A. **Californicum**, Gr. Calyx-lobes and bractlets nearly equaling corolla.
5. A. **tuberosum**, Gr. Stems thick, 1-3 in. high: flowers densely crowded.
6. A. **pinetorum**, Gr. More slender, ½-1 ft. high: flowers looser. Oregon.

2. BOSCHNIAKIA, C. A. Meyer.

1. B. **strobilacea**, Gr. A thick, brownish red spike of striped flowers.

LENTIBULARIACEÆ.

1. UTRICULARIA, Linnæus.

Stems stout, densely leafy: leaves 2-3-pinnate, very bladdery........................... 1

Stems filiform: leaves scattered, repeatedly forked, bristly.............................. 2

Stems slender: leaves 2-ranked, not bladdery, forking...................................... 3

1. U. **vulgaris**, L. Scapes 5-16-flowered: corolla ½ in. broad or more.
2. U. **minor**, L. Scapes 3-7 in. high: corolla 2-3 lines broad: spur short.
3. U. **intermedia**, Hayne. Scape 1-4-flowered: corolla ½ in. broad.

VERBENACEÆ.

Corolla nearly equally 5-lobed: calyx 5-toothed: small flowers in spikes.............. 1
Corolla bilabiate, 4-lobed: calyx 2-cleft: small heads on slender peduncles...... 2

1. VERBENA, Tournefort.

1. **V. officinalis**, L. Spikes filiform, bracts minute: leaves pinnatifid.
2. **V. polystachya**, HBK. Leaves serrate: corolla a line broad. Rare.
3. **V. hastata**, L. Erect, 3-6 ft high: leaves coarsely serrate, petioled.
4. **V. prostata**, R. Br. Diffuse, spreading, hairy: corolla 2 lines broad.
5. **V. bracteosa**, Michx. Similar, but rigid bracts exceeding smaller flowers.

2. LIPPIA, Linnæus.

1. **L. nodiflora**, Michx. Creeping: peduncles 1-4 in. long: flowers rose to white.

LABIATÆ.

§ 1. Stamens 4, coiled in the bud, much exserted through a cleft in the upper lip: leaves entire: corolla and curved filaments blue or purple............................. 1

§ 2. Stamens erect or ascending, the posterior pair shorter or wanting: anther-cells short, close together or united: upper lip of corolla not concave or hooded (except in No. 9).

* *Corolla small, almost equally 4-lobed: axillary flowers in dense whorl-like clusters, the upper axils flowerless.*

Stamens 4, nearly equal, all perfect: calyx 5 toothed................................ 2
Stamens 2, with anthers, posterior pair sterile or wanting........................... 3

* * *Corolla bilabiate: stamens 4.*

Flowers capitate: calyx equally 5-toothed: stamens distinct, straight.
  Upper lip of corolla entire or merely notched..................................... 4
  Upper lip 2-cleft: stamens exserted........ 5
Flowers solitary or in clusters, axillary: curved stamens all perfect.
  Flowers small, white or purple: not ½ in. long.................................. 6
  Flowers over an inch long, orange; peduncles bracteate.......................... 7
Flowers in oblong heads or interrupted spikes, blue or purple......................... 8
Flowers in axillary clusters, rose and white: upper anthers imperfect................. 9
Flowers with white or purplish corolla an inch long: stamens perfect................. 10

§ 3. Stamens 2, the upper pair rudimentary or wanting: anthers 1-celled or with 2 cells widely separated on the ends of a filament-like connective: flowers in dense terminal heads or globose whorls (except sp. 8 of No. 1[illegible].

Connective versatile upon the short filament. Leaves pinnatifid.................... 11

Connective joined to the filament by one end; only one anther cell.................. 12

§ 4. Stamens 4, perfect: corolla bilabiate: calyx 15 nerved.

Flowers in oblong peduncled heads, pale violet: stamens exserted.................. 13

§ 5. Stamens 4, perfect, ascending under the concave or hooded upper lip.

Calyx with a projection on upper side: flowers solitary axillary.................. 14

Calyx purple-tinged, upper teeth broad, obtuse, lower two lanceolate.................. 15

Calyx 10-toothed, the shorter 5 teeth spiny, recurved: corolla small, white.......... 16

Calyx nearly equally 5-toothed: flowers in whorls or interrupted spikes.................. 17

1. TRICHOSTEMA, Gronovius.

1. **T. oblongum**, Benth. Corolla-tube shorter than the calyx. Or.–Cal.
2. **T. laxum**, Gr. Diffuse: leaves petioled: cymes peduncled, often forked.
3. **T. lanceolatum**, Benth. Gray-green: leaves crowded, sessile. Or.–Cal.
4. **T. ovatum**, Curran. Leaves round-ovate: calyx densely villous. S. Cal.
5. **T. lanatum**, Benth. Shrubby: leaves narrow: corolla woolly. Santa Barbara, S.

2. MENTHA, Linnæus.

1. **M. Canadensis**, L. Villous: leaves oblong-ovate or narrower.

Var. glabrata, Benth. The similar serrate acute leaves nearly glabrous.

3. LYCOPUS, Tournefort.

1. **L. Virginicus**, L. Stem obtuse-angled: sterile filament minute. Or.
2. **L. lucidus**, Turcz, **var. Americanus**, Gr. Stem acute-angled, stout: runners tuberiferous: calyx-teeth slender, equaling corolla.
3. **L. sinuatus**, Ell. Leaves mostly incised or pinnatifid. N. Cal., Or.

4. PYCNANTHEMUM, Michaux.

1. **P. Californicum**, Torr. Leaves ovate or narrower, sessile, 1-3 in. long.

5. MONARDELLA, Bentham.

§ 1. Calyx over ½ in. long: corolla-tube much longer than the lobes.............. 1, 2

§ 2. Calyx ¼-⅓ in. long: corolla-tube but little longer than the linear or oblong flat lobes: flowers in dense involucrate heads.

* *Tufted: corolla flesh-color to rose, lobes linear: calyx-teeth soft.*

Leaves ovate to lanceolate, petioled, pinnately veined: bracts obtuse........... 3, 4, 5

Leaves linear to oblong, entire, ½-¾ in. long, upper subsessile.................... 6, 7

* * *Annuals loosely branching: leaves entire or undulate, rather distinct, narrowed into a petiole: calyx-teeth with margined nerve.*

Bracts rigidly cuspidate white and transparent except the veins................. 8, 9

Bracts acute or obtuse nervose, less transparent or the outer green............ 10, 11

Bracts broadly ovate, white-scarious, nervose with cross veins: corolla white or nearly so, only 3 or 4 lines long: calyx-teeth with scarious tips...................... 12, 13

1. **M. macrantha**, Gr. Orange red or scarlet corolla 1-1½ in. long. San Diego.
2. **M. nana**, Gr. Similar, more hairy: corolla white, rose-tinged, smaller. S. Cal.
3. **M. hypoleuca**, Gr. Densely white-tomentose: bracts nervose. S. E. Cal.
4. **M. villosa**, Benth. Soft-hairy or glabrate: bracts pinnately veined. Western Cal.
5. **M. odoratissima**, Benth. Nearly glabrous: bracts thin, whitish or purplish.
6. **M. linoides**, Gr. Ashy-pubescent: bracts scarious, white, pinkish. S. Cal.
7. **M. Palmeri**, Gr. Green: bracts very obtuse: otherwise like the last. S. Cal.
8. **M. Douglasii**, Benth. Bracts silvery between pinnate nerves and margin.
9. **M. Breweri**, Gr. Bracts broader, less translucent, wanting marginal nerve.
10. **M. lanceolata**, Gr. Bracts acute, cross veinlets between the nerves.
11. **M. undulata**, Benth. Bracts broadly ovate, not cross-veined. Coast.
12. **M. candicans**, Benth. Bracts with greenish nerves. Cent. Cal.
13. **M. leucocephala**, Gr. Bracts whiter, lightly nerved calyx-teeth slender.

6. MICROMERIA, Bentham.

1. **M. Douglasii**, Benth. Creeping: leaves round-ovate: pedicels slender. Coast.
2. **M. purpurea**, Gr. Erect: leaves lanceolate: flowers in dense clusters.

7. CALAMINTHA, Tournefort.

1. **C. mimuloides**, Benth. Hirsute, viscidulous. Monterey Bay.

8. POGOGYNE, Bentham.

Stamens all perfect: stigmas nearly equal: corolla ½-¾ in. long................. 1, 2, 3

Stamens 2 perfect: stigmas very unequal: corolla ⅛ in. long........................ 4, 5

1. **P. Douglasii**, Benth. Spikes oblong, white-hispid, bracts acute.
2. **P. parviflora**, Benth. Smaller; bracts mostly obtuse. S. F. Bay, N.
3. **P. nudiuscula**, Gr. Flowers in whorl-like clusters: bracts less hispid. S. Cal.
4. **P. ziziphoroides**, Benth. Flowers mostly in heads or short spikes.
5. **P. serpylloides**, Gr. Flowers in whorls or long interrupted spikes.

9. ACANTHOMINTHA, Gray.

1. **A. ilicifolia**, Gr. Rigid, 3-6 in. high: leaves broad, often cuspidate-toothed.
2. **A. lanceolata**, Curran. Taller: leaves lanceolate: flowers larger, an inch long.

10. SPHACELE, Bentham.

1. **S. calycina**, Benth. Shrubby: leaves rugose: hairy ring in corolla-base.

11. SALVIA, Linnæus.

1. **C. carduacea**, Benth. White-woolly, thistle-like: lavender corolla 1 in. long.
2. **C. Columbariæ**, Benth. Branching: leaves pinnatifid: blue corolla ¼-⅓ in. long.

12. AUDIBERTIA, Bentham.

Corolla 1½ in. long, crimson-purple: large leaves very rugose........................ 1
Corolla ½ in. long or less, violet or bluish.. 2, 3, 4, 7
Corolla ⅜-¾ in. long: stems woody below, 3-10 ft. high.............................. 5, 6, 8

1. **A. grandiflora**, Benth. Stout, slightly woody. S. F. Bay, south.
2. **A. incana**, Benth. Leaves not rugose, 1 in. long or less. San Diego.
3. **A. humilis**, Benth. A span high, simple, stems nearly naked, base leafy.
4. **A. stachyoides**, Benth. Several ft. high: forming dense thickets. Cal. Coast.
5. **A. Palmeri**, Gr. Leaves oblanceolate, acute: whorls 4-8, distant. San Diego.
6. **A. Clevelandi**, Gr. Similar: leaves obtuse: whorls fewer: viscid. San Diego.
7. **A. nivia**, Benth. White-hoary, 3-4 ft. high: stamens exserted. Santa Barbara, S.
8. **A. polystachya**, Benth. Mostly very white: flowers in a thyrsus. S. Coast.

13. LOPHANTHUS, Benth.

1. **L. urticifolius**, Benth. Green, 4 to 6 ft. high: leaves ovate or cordate, large.

14. SCUTELLARIA, Linnæus.

Corolla slender. ½-⅔ in. long, deep blue or violet: leaves ovate........................ 1
Corolla larger, ½-1 in. long, violet-blue: leaves oblong or narrow...................... 2, 3
Corolla white or dull yellow: upper leaves entire, obtuse.............................. 4, 5

1. **S. tuberosa**, Benth. Soft-hairy, mostly 3 or 4 in high: many tubers. Cent. Cal.
2. **S. angustifolia**, Pursh. Stems slender: corolla hairy inside, ⅜-1 in. long.
3. **S. antirrhinoides**, Benth. Similar: leaves and corolla broader and shorter.
4. **S. Californica**, Gr. Slender: leaves short-petioled; upper short.
5. **S. Bolanderi**, Gr. More pubescent, very leafy: leaves sessile, broad, veiny.

15. BRUNELLA, Tournefort.

1. **B. vulgaris**, L. Simple stems ending in a dense spike of violet flowers.

16. MARRUBIUM, Tournefort.

1. **M. vulgare**, L. Hoary, bitter. Common Horehound naturalized.

17. STACHYS. Tournefort.

Corolla white or whitish: leaves soft-hairy or white tomentose.................. 1, 2, 3
Corolla purple or rose, ½ in. long or less; tube not exceeding calyx.................. 4
Corolla purple or rose; tube exceeding the calyx.................................. 5, 6, 7

1. S. **ajugoides**, Benth. Softly white-hairy: leaves oblong obtuse: ill-scented.
2. S. **albens**, Gr. White-woolly, leafy, often tall: leaves rather acute.
3. S. **pycnantha**, Benth. Tawny-hairy, leafy: leaves obtuse, spike short, dense.
4. S. **palustris**, L. Leaves ovate-lanceolate, acute, mostly sessile. Or.
5. S. **bullata**, Benth. Mostly hispid, light rose flowers in interrupted spikes.
6. S. **Chamissonis**, Benth. Much larger: leaves 2-5 in. long. Wet ground.
7. S. **ciliata**, Dougl. Similar; leaves thinner, less hairy. Or. Coast.

PLANTAGINACEÆ.

1. PLANTAGO, Tournefort.

Stamens 4. Leaves not fleshy, 1-8-ribbed or nerved........................ 1, 5, 6

Leaves somewhat fleshy, oblanceolate to lanceolate or broader.... 2, 3, 7

Leaves fleshy, linear to filiform; spike dense, cylindrical................ 4

Stamens 2: leaves linear to filiform, 1-4 in. long: annuals........................ 8, 9

1. P. **major**, L. var. **Asiatica**, Decne. Leaves ovate or oval: scape ½-2 high.
2. P. **eriopoda**, Torr. Yellowish wool at base: scape ½-1 ft. high. N. Cal. to Alaska.
3. P. **macrocarpa**, C. & S. Petioles long: capsule ¼-⅓ in. long. Coast, Wash.
4. P. **maritima**, L. Corolla-tube pubescent: seeds 2 to 4. Common on the Coast.
5. P. **lanceolata**, L. Petioles slender: scape deeply furrowed; spike short. Nat.
6. P. **Patagonica**, Jacq. Usually silky-woolly: slender leaves acute: spikes short.
7. P. **hirtella**, HBK. Scape with long dense spike, 1-2 ft. high. Cal. Coast.
8. P. **Bigelovii**, Gr. Spike dense, ½-1 in. long: capsule 4-seeded. Saline marshes.
9. P. **heterophylla**, Nutt. Spike 2-5 in. long, very slender: seeds 10-28. Cal.

CLASS II.—ENDOGENS OR MONOCOTYLEDONS.

ALISMACEÆ.

Flowers perfect: stamens usually 6: carpels in a whorl.

Carpels numerous, distinct, obovate-oblong, flattened: scape paniculate........ 1

Carpels 6-12, united at base, tapering to a beak: scape simple................. 2

Flowers monœcious or diœcious: carpels many, capitate, winged, short-beaked........ 3

1. ALISMA, Linnæus.

1. **A. Plantago,** L. Scape with branches in whorls: leaves ovate to lanceolate or narrower: petals small, white or pinkish. In water or mud.

2. DAMASONIUM, Jussieu.

1. **D. Californicum,** Torr. Scapes 6-18 in. high: leaves ovate to narrowly lanceolate, long-petioled: flowers in 3 or 4 whorls; pedicels 1-2 in. long: petals 3-4 lines long, incised above, white. In water or mud. S. N. Mts.

3. SAGITTARIA, Linnæus.

1. **S. variabilis,** Engelm. Leaves ovate-sagittate or some linear: flowers mostly in 3's: petals white, rounded ⅓-⅔ in. long: tubers edible. In water or mud.

ORCHIDACEÆ.

Herbs with a more or less irregular perianth of 3 sepals and 3 petals; the lower petal (made so by a twist in the inferior ovary), called the *lip*, usually unlike the other two which generally resemble the sepals. Stamens and style united to form the *column* which is capped by a single perfect 2-celled anther, or (in *Cypripedium*) with a perfect anther on each side of the stigma over which curves a triangular sterile stamen. Our genera are usually grouped in four tribes here briefly defined.

I. Anther resting lid-like upon the column, deciduous: pollen-masses 4........ 1, 2, 3
II. Anther united with column, persistent on its face above stigma: pollen-masses 2.. 4
III. Anther erect on top of column, persistent: pollen-masses 2-4.............. 5 to 9
IV. Anthers 2, lateral; the sterile stamen petaloid, incurved...................... 10

* *Herbs with one to many green leaves: not parasitic.*

Leaf solitary from a globose corm. Scape 1-flowered............................. 1
Scape 6-20-flowered............................. 3
Leaves several to many from a creeping rootstock.................................. 6
Leaves a pair below the raceme of small flowers, ovate or cordate..................... 7
Leaves 2 or 3 to many clasping slender or stoutish stems, at least at base.
Flowers not leafy-bracted, white or greenish, in spikes or racemes.
Lip of perianth spurred at base.. 4
Lip not spurred: spike twisted: flowers 3-ranked.............................. 5
Flowers leafy-bracted, pedicellate, 1-20.
Lip concave at base, constricted in middle.................................. 8
Lip an inflated sac, the mouth with incurved margin.......................10

* * *Plants with no green leaves: stems simple, scape-like.*

Flowers and stems brownish, purplish or yellowish, often mottled or striped. **2**
Flowers and stems nearly or quite white **9**
Flowers and stems greenish: bracts membranaceous, acute. Sp. 8 in. **4**

1. CALYPSO, Salisbury.

1. **C. borealis**, Salisb. Stem 3-6 in. high: slender bract at top, subtending a drooping showy flower: sepals and petals lanceolate, rose-tinged ½-⅔ in. long; lip saccate, 2-spurred, mottled. Springy places or bogs, from Russian River (*Miss Wood*) to Br. Am. and E. to the Atlantic. Also in N. Eu. and Asia.

2. CORALLORHIZA, Haller.

Sepals and petals similar; lip dilated, recurved, flat or concave, 2-ridged at base. Column incurved. Rootstocks coral-like, hence the name *Coral-root*.

1. **C. multiflora**, Nutt. Sepals and petals 3-4 lines long, yellowish or whitish, purple tinged: spur formed by decurrent side-sepals wholly adnate to the ovary; lip broadly ovate, 3-lobed, the middle lobe with undulate or denticulate margin, often purple-mottled. Mts., San Diego to Br. Col., E. to the Atlantic.
2. **C. Mertensiana**, Bong. Similar: flowers red: lower half of the spur free: lip narrower, entire or with small teeth at base. Humboldt Bay to Alaska.
3. **C. innata**, R. Br. Smaller: sepals 1½-2 lines long: spur very short. Wash.
4. **C. Bigelovii**, Watson. Stout: sepals and petals oblong, obtuse, 4 lines long, purple-veined; spur none. S. N. & Coast Mts., Cal.
5. **C. striata**, Lindl. Similar: perianth 6-7 lines long. S. N. Mts., N. & E.

3. APLECTRUM, Torrey.

1. **A. hiemale**, Torr. Scape a foot high or more: leaf plaited, 4-8 in. long: perianth ½ in. long, greenish brown; lip whitish, somewhat spotted, deeply 3-lobed, 3-ridged. The glutinous bulbs give the name *Putty-root*. Or. E. to the Atlantic.

4. HABENARIA, Willd.

Stems slender: leaves few and at base: perianth 2 lines long or less 1, 2
Stems leafy. Spur 4-6 lines long, slender: lip narrow 3, 4, 5
Spur short and thick 6, 7

1. **H. elegans**, Bolander. Spike dense: sepals and petals equal. Coast, Monterey, N.
2. **H. Unalaschensis**, Watson. Spike less dense: flowers smaller: bracts ovate.
3. **H. leucostachys**, Watson. Stout: flowers many, white: capsule sessile. Swamps.
4. **H. sparsiflora**, Watson. Lower, more slender: leaves narrower: greenish flowers 10-20, distant, exceeded by the slender bracts: capsule sessile. S. N. Mts. & N. Cal.
5. **H. pedicellata**, Watson. Raceme loose: capsule tapering into a pedicel.

6. **H. Cooperi**, Watson. Stout: lip ovate: upper sepal ovate. San Diego.
7. **H. gracilis**, Watson. Like No. 4: lip linear: spur saccate. Or., Wash.
8. **H. Michæli**, Greene. Stout stem, leafless: spike dense: sepals ¼ in. long. S. Cal.

5. SPIRANTHES, Richard.

1. **S. Romanzoffiana**, Chamisso. Spike dense, conspicuously bracteate, 1-4 in. long: perianth greenish-white, ⅓ in. long, curved (Called *Ladies' Tresses*). Wet places.
2. **S. porrifolia**, Lindl. Similar: flowers smaller: 2 callosities at base of lip.

6. GOODYEARA, Robt. Brown.

1. **G. Menziesii**, Lindl. Scape pubescent, 6-15 in. high: leaves smooth, 2-3 in. long, in a rosulate tuft: spike of puberulent white flowers 1-sided. (*Rattlesnake Plantain.*)

7. LISTERA, Robt. Brown.

1. **L. Convalarioides**, Nutt. Slender, 3-12 in. high: flowers purplish in a pubescent raceme: lip 2-lobed or emarginate, toothed at base, 2-5 lines long. Damp woods.
2. **L. cordata**, R. Br. Smaller: flowers minute, smooth. (*Twayblade.*) N. Cal., N.

8. EPIPACTIS, Haller.

1. **E. gigantea**, Dougl. Leafy, 1-4 ft. high: leaves ovate to lanceolate: flowers 3-10, greenish, purple-veined: sepals ovate-lanceolate, ½-⅔ in. long; lip as long. Along streams.

9. CEPHALANTHERA, Richard.

1. **C. Oregana**, Reich. f. Parasite: perianth ½ in. long; sepals and petals lanceolate; lip as in *Epipactis* with wavy-crested nerves. Forests, N. Cal to Or.

10. CYPRIPEDIUM, Linnæus.

1. **C. fasciculatum**, Kellogg. Villous, 2-6 in. high: leaves ovate, a pair: peduncle viscid: flowers several in a cluster or 1, greenish. (*Bradley's Cypripedium*). Rare.
2. **C. montanum**, Dougl. Leafy, 1-2 ft. high: flowers 1-3; sepals and wavy-twisted petals brownish, narrow, 1½-2½ in. long: lip oblong, white, purple-veined. Cent. Cal. to Or.
3. **C. Californicum**, Gr. Often taller: flowers 3-12: sepals ½ in. long: lip obovoid-globose. In swamps or wet places. N. Cal.

IRIDACEÆ.

Perennial herbs with sword-shaped or grass-like leaves, the divisions of the superior perianth all petaloid and convulute in the bud, withering-persistent.

Outer segments of perianth larger, recurved or spreading; the inner erect or incurved: style-branches petaloid, curving over the linear anthers.......................... 1

Segments nearly alike: stigmas filiform: filaments often united.................. 2

1. IRIS, Tournefort.

* *Perianth-tube stem-like above the ovary, ½-3 in. long: stems leafy*.................. 1, 2

* * *Perianth-tube short and funnelform above the ovary.*

Stems leafy: bracts (enclosing peduncles and buds) green, often distant............ 3, 4

Stems naked or with 1 or 2 leaves, terete: floral bracts not distant................ 5, 6

Stems with many bracts and rigid radical leaves.. 7

Stems with 2-3 short bract-like leaves, 2-flowered... 8

1. I. **macrosiphon**, Torr. Stems very slender, flattened, surpassed by the dark green grass-like leaves: flowers rich purple-blue, on short pedicels; tube 1-3 in. long; sepals 1½-2 in. long. S. F. Bay to Humboldt Bay. Placer Co.
2. I. **Douglasiana**, Herbert. Stouter and taller stems: leaves and bracts broader, pedicels longer; tube shorter; sepals usually with a white center, blue-purple or lilac: often yellow or buff. S. F. Bay to Siskiyou Mts.
3. I. **Hartwegi**, Baker. Stems slender, flattened, 2-9 in. high: leaves 2-3 lines wide: flowers light colored. S. N. Mts. June.
4. I. **tenax**, Dougl. Similar, taller, 1-flowered: flowers larger, bright lilac-purple, segments 2-2½ in. long. Or. to Br. Col.
5. I. **longipetala**, Herbert. Stems stout, equaling the leaves, 3-5-flowered: sepals lilac or whitish, purple and yellow veined, 2½-3 in. long. Monterey to Or.
6. I. **Missouriensis**, Nutt. More slender: leaves narrower: bracts dilated, scarious, 1-1½ in. long: flowers pale blue. N. Cal. to Or.
7. I. **bracteata**, Watson. Leaves striate, sides unlike: perianth yellow, 2-3 in. long. (*Howell's Iris.*) Discovered by Thos. Howell in S. W. Or., 1884.
8. I. **tenuis**, Wats. Perianth white, veined with yellow and purple, 1½ in. long. (*Henderson's Iris.*) Discovered by L. F. Henderson in Or., 1881.

2. SISYRINCHIUM, Linnæus.

1. S. **bellum**, Wats. Flowers blue, purple-striped, ½-1 in. broad. Cal., Or.
2. S. **Californicum**, Ait. f. Scape winged: flowers yellow. Coast. Wet places.
3. S. **grandiflorum**, Dougl. Flowers red-purple, 1-1½ in. broad. N. Cal. to Br. Col.

LILIACEÆ.

§ 1. Floral bracts not leaf-like: perianth persistent: anthers introrse: style entire.

* ***Flowers in umbels or heads upon naked scapes: root a bulb or corm.***

a. Perianth parted to the base or nearly so: stamens at base; anthers versatile.

Flowers rose-purple to white: bracts broad: odor of onions........................... 1

Flowers greenish white: bracts narrow: slender leaves several......................... 2

Flowers yellow: pedicels jointed at top: leaves one or several........................ 3

b. Perianth not parted to the base: stamens on the throat.

Perianth-tube thin, somewhat inflated and angular or saccate: stamens on the throat in one row; anthers basifixed, 3 alternating with petaloid staminodia or smaller anthers: ovary nearly or quite sessile.. 4

Perianth-tube thicker, opaque, not inflated or saccate: anthers basifixed, 3 alternating with petaloid staminodia: filaments decurrent to base: ovary sessile............. 5

Perianth-tube not inflated or saccate: filaments in two rows (except sp. 11); anthers versatile.. 6

Perianth-tube subcylindrical, 6-saccate at base, scarlet or crimson, the short segments yellowish: stamens 3 alternating with broad staminodia.......................... 7

* * *Flowers on short scape-like pedicels, umbellate on an underground peduncle.*

Perianth salver-form; tube slender, 1-2 in. long; lobes half as long................... 8

* * * *Flowers in racemes or panicles; perianth segments distinct and anthers versatile (except No. 12.)*

a. Stems scape-like or sparingly leafy, arising with many leaves from a bulb.

Flowers blue or white, ½-1½ in. long, slightly one-sided, in a simple raceme............ 9

Flowers white or whitish, 2-5 lines long in a dense nearly simple raceme............. 10

Flowers white or pinkish, scattered on branches: withering perianth twisted......... 11

Flowers white or yellowish, paniculate: perianth-tube equaling reflexed lobes....... 12

b. Stems not scape-like, simple: rootstock slender: white flowers small.

Leaves 2-ranked, sessile, often clasping, lanceolate to ovate...................... 13

Leaves 2, rarely 3, petioled, cordate: perianth-segments 4: stamens 4.............. 14

c. Stems rigid: lower bracts and rigid leaves spine-tipped: flowers 1-3 in. long...... 15

§ 2. Floral bracts none or leaf-like: perianth segments distinct, deciduous: anthers extrorse or opening on the sides. In No. 24 the perianth is persistent: anthers introrse.

a. Stem simple, from a scaly bulb: leaves often whorled: perianth segments similar: anthers versatile: style long: fruit a capsule: seeds flat, horizontal.

Segments oblanceolate, with a groove: style entire: stigma large, 3-lobed........... 16

Segments broader, not groved: style entire or 3-cleft; stigmas small................. 17

b. Stem from a coated corm: anthers basifixed.

Leaves a pair at the base, broad: perianth-segments similar, lanceolate, recurved.... 18

Leaves few, linear-lanceolate: perianth-segments unlike, the inner (petals) broad.... 19

c. Stem branching, leafy above: rootstock slender: flowers nodding or hanging.

Flowers apparently axillary: anthers 1-2-awned or pointed above, sagittate.......... 20

Flowers white or greenish, terminal, in clusters or solitary, beneath the leaves..... 21

d. Stem a scape or scape-like from a rootstock: large leaves basal: flowers umbellate or solitary, red or white: filaments hairy: ovary 2-celled: fruit a many-seeded berry. 22

e. Stemless: leaves a pair, broad; flowers umbellate on an underground peduncle: pedicels 3-cornered prostrate and curved in fruit: stamens 3: styles 3, divergent.... 23

f. Stem with 3 broad leaves at top and a single flower: outer segments green....... 24

§ 3. Bracts greenish or scarious: flowers in a simple raceme or panicle: segments distinct, persistent: anthers small: styles or sessile stigmas persistent; capsule deeply 3-lobed.

a. Stem tall, leafy: leaves large ovate to lanceolate, nerved, plicate: panicles large. 25

b. Stem from a coated bulb, leafy at base: leaves linear or grass-like, smooth.

Flowers white, erect: yellow glands at base of segments........................ 26

Flowers yellowish or purplish, nodding glandless................................. 27

c. Stem equitant-leafy, from a rootstock: leaves slender; anthers 2-celled, introrse.

Flowers small, greenish, each with a cup-like or 3-lobed involucre................. 28

Flowers yellowish-green: filaments woolly; style none............................ 29

d. Stem with a large tuft of grass-like stiff leaves from a rootstock: raceme of white flowers very dense, long: anthers extrorse: styles reflexed or coiled............ 30

1. ALLIUM, Linnæus.

§ 1. Bulbs connected with rootstocks: leaves 2 or more: capsule not conspicuously crested.

Scape round, 1-2 ft. high, exceeding the leaves: bracts 2, large, acuminate: bulb white.. 1

Scape flattened above: umbels often nodding: stamens and style slender; bracts united a base 2, 3

§ 2. Bulbs without rootstocks: scape not flattened, slender: leaves very slender.

a. Leaves 2 or more, shorter than, or scarcely exceeding the scape.

Ovary obscurely crested: perianth rose: stamens included: scape 3-10 in. high... 4, 5, 6

Ovary distinctly 6-crested.

Perianth-segments white or light pink becoming thin and lax.

Bracts 2, short, acute; stamens included...................................... 89

Perianth rose-color: filaments deltoid-widened at base.................. 10, 11

Filaments filiform crests conspicuous 12, 13

b. Leaves 2 or more, much exceeding the very short scape.................. 14, 15

§ 3. Scape much flattened, 2-edged, short: leaves 2, linear, flat, falcate: flowers rose-color.

Bracts 2: stamens included... 16, 17, 18

Bracts 3-5: stamens not included: leaves ½-1 in. broad............................ 19

1. **A. unifolium**, Kell. Leaves 2-4: segments 5-7 lines long exceeding stamens.

2. **A. validum**, Wats. Scape 1-3 ft. high: bracts 2-4, broad: pedicels ¼-½ in. long: segments slender 3-4 lines long: bulb-coats white. Alpine, July to Sept.

3. **A. hæmatochiton**, Wats. Scape slender, 4-12 in. high: bracts 2, short: flowers deep purple or rose-color: bulb-coats deep reddish purple, shining. S. Cal. Coast.

4. **A. acuminatum**, Hook. Perianth-segments serrulate, 4-7 lines long, tips acuminate, recurved, rigid in fruit. Washington to Cent. Cal. Rare.
5. **A. Bolanderi**, Wats. Similar: flowers rarely white: stamens adnate to the middle, half as long as the segments which are nearly straight. N. W. Cal.
6. **A. lacunosum**, Wats. Scape 3-6 in. high: pedicels ¼-½ in. long: stamens nearly equaling perianth; filaments a little expanded at base. Cent. Cal.
7. **A. Sanbornii**, Wood. Slender, 1-2 ft. high: perianth 2-3 lines long. S. N. Mts.
8. **A. attenuifolium**, Kell. Leaves filiform, sheathing the scape near base.
9. **A hyalinum**, Curran. Perianth thin, transparent in fruit: capsule 1-seeded.
10. **A. serratum**, Wats. Outer bulb-coats with distinct zigzag lines along which they tear horizontally into serrate strips: inner perianth segments shorter, narrower.
11. **A. bisceptrum**, Wats. Scapes often in 2's, rarely angular. S. N. Mts.
12. **A. campanulatum**, Wats. Flowers many: perianth light rose-color. S. N. Mts.
13. **A. Bidwelliæ**, Wats. Smaller: flowers fewer, smaller, bright rose. S. N. Mts.
14. **A. tribracteatum**, Torr. Scarcely 2 in. high; bracts 3. Mostly alpine.
15. **A. parvum**, Kell. Similar: bracts 2, shorter. Sierra Valley.
16. **A. falcifolium**, H. & A. Scape 2-5 in. high: capsule 3-crested. Coast Mts.
17. **A. Breweri**, Wats. Scape 1-3 in. high: crests 3, slightly lobed. Coast Mts.
18. **A. Lemmoni**, Wats. Taller leaves nearly straight. Sierra Valley.
19. **A. platycaule**, Wats. Scape and leaves broader. Montane. S. N. Mts.

2. MUILLA, Watson.

1. **M. maritima**, Wats, Perianth-segments 2-3 lines long, subrotate. Coast.

3. BLOOMERIA, Kellogg.

1. **B. aurea**, Kell. Scape 6-18 in. high: leaf solitary: each filament surrounded at base by a 2-cuspidate appendage: Coast Ranges, Monterey to San Diego.
2. **B. montana**, Greene. Larger: flowers an inch broad: cusps of the filament-appendage half as long as the filament: anthers 1½ lines long. S. Cal.
3. **B. Clevelandi**, Watson. Leaves several, very slender: style short. San Diego.

4. BRODIÆA, Smith.

[The next two genera are united with this in the Botany of California and the Cal. Flora. E. L. Greene of the University of California has recently elaborated the species under the generic names here given.]

Stamens 3, alternating with bifid or entire staminodia........................ 1, 2, 3
Stamens 6, 3 with petaloid appendages back of the anther........................ 4, 5

1. **B. volubis**, Baker. Twining scape 4-10 ft. high: perianth rose-color to white: sagittate anthers 2-appendaged on the back. *Stropholirion Californicum* Torr. Cent. Cal.

2. **B. multiflora,** Benth. Scape 2-4 ft. high: perianth violet-purple 8-10 lines long: staminodia obtuse, entire. Or. to Cent. Cal., June, July.
3. **B. congesta,** Smith. Scape 2-5 ft. high: purple staminodia bifid. B. C. to C. Cal.
4. **B. pulchella,** Greene. Perianth-tube, like the last, constricted above: distinguished by the stamens and strictly umbellate inflorescence. Cal., May, June.
5. **B. capitata,** Benth. Scape 6-18 in. high: bracts often dark purple: perianth-tube not constricted above. Very abundant in Cent. Cal., S. & E., Jan. to Apr.

5. HOOKERA, Salisbury.

1. **H. Californica,** Greene. Scape 2 ft. high: pedicels 2-3 in. long: perianth 1½-2 in. long, deep purple to rose-color: anthers ½ in. long, a little exceeded by the retuse staminodia. This and next under *Brodiæa grandiflora* in Cal. Bot. Sacramento Val. Much less common than the next species.
2. **H. coronaria,** Salisb. Smaller: anthers exceeding the acute staminodia.
3. **H. minor,** Britten. Scape 3-6 in. high: perianth-segments rotate: anthers 2 lines long exceeded by the emarginate or retuse staminodia. Sac. Val., S.
4. **H. terrestris,** Britten. Scape usually not rising above ground: pedicels 3-4 in. long: staminodia yellowish, margins involute. S. F. Bay, N.
5. **H. stellaris,** Greene. Scape 2-6 in. high: perianth red-purple: anthers 2-appendaged; staminodia longer, white. (*Purdy's Hookera.*) Near Ukiah.
6. **H. rosea,** Greene. Similar: perianth rose-red: stamens not appendaged; filaments triangular. Lake Co., Cal. Discovered by Mrs. Curran, May, 1884.
7. **H. Orcuttii,** Greene. Scape a foot or more high: staminodia wanting or obscure. San Diego. Discovered by C. R. Orcutt in 1884.

6. TRITELEIA, Douglas.

Perianth-tube broad at base: upper and inner stamens with winged filaments...... 1, 2
Perianth-tube tapering to a narrow base: filaments not winged or appendaged.
    Stamens in 2 rows: flowers not yellow.............................. 3, 4, 5
    Stamens in 1 row; filaments broadening downward............................ 6
    Stamens in 2 rows or nearly equal: flowers yellow.......................... 7, 8
Perianth-tube short; segments rotate, yellow: filaments with appendages........ 9, 10
Perianth open-campanulate, cleft below the middle: stamens in 1 row.......... 11, 12

1. **T. grandiflora,** Lindl. Pedicels ½-1 in. long, numerous: perianth light blue, 1 in. long: lower anthers sessile, upper on filaments which are winged below. Or. and Wash. E.
2. **T. Howellii,** Greene. Similar: upper filaments winged above. Or. & Wash.
3. **T. candida,** Greene. Scape 2-4 ft. high: perianth 1½ in. long, white: filaments coiled. Discovered by J. R. Scupham. Fresno Co., Cal., June 1886.
4. **T. laxa,** Benth. Umbel of usually 15-30 purple-blue flowers: anthers acute. Cal.

5. **T. peduncularis,** Lindl. Pedicels often 6-10 in. long: perianth rose-purple to nearly white, cleft below the middle, 1 in. long: anthers retuse. Wet places Cent. Cal.

6. **T. Bridgesii,** Greene. About a foot high: umbel rather few-flowered: perianth light blue. Very common in open forests about Humboldt Bay. Chico.

7. **T. crocea,** Greene. Perianth 7-9 lines long: lower filaments very short. N. Cal.

8. **T. gracilis,** Greene. Smaller: filaments subequal: anthers acute. S. N. Mts.

9. **T. ixioides,** Greene. Scape ½-2 ft. high: filaments unequal, wing-dilated, 2-appendaged above. S. Cal. to Or.

10. **T. lugens,** Greene. Similar: perianth dark brown outside: winged filaments not forked above. Collected by E. L. Greene near Vacaville, Cal., May 4, 1886.

11. **T. hyacinthina,** Greene. Perianth white with green veins, rarely purple-tinged: filaments broad at base, united into a ring. Moist ground. Cent. Cal. N.

12. **T. lilacina,** Greene. Smaller: perianth lilac-purple: filaments not so broad at base, distinct. Col. in Amador Co. by Mrs. Curran. May, 25, 1886.

N.B.—No. 1 is *Brodiæa Douglasii*, Wats.; No. 11, *B. lactea*, Wats.; No. 2, 4, 5, 6, 7, 8, 9, have the same specific names under *Brodiæa* in the Cal. Bot. No. 3, 10, 12 are new. ***Behria tenuiflora***, Greene, of the California Peninsula, is the type of a new genus belonging **between this and the next.** It is appropriately dedicated to Dr. H. H. Behr, of the University of California.

7. BREVOORTIA, Wood.

1. **B. coccinea,** Wats. Flowers pendulous, 1-1¼ in. long. N. Cal. (*Firecrackers.*)

8. LEUCOCRINUM, Nuttall.

1. **L. montanum,** Nutt. White flowers surpassed by the leaves. Cal. E.

9. CAMASSIA, Lindley.

1. **C. esculenta,** Lindl. Flowers irregular, lower segment deflexed: segments not connivent in age, persistent: seeds shining. N. Cal., N & E to Montana.

2. **C. Leichtlinii,** Watson. Nearly regular flowers larger; segments broader, connivent and twisted, at length deciduous: seeds obovoid, dull. S. F. Bay, N. to Wash.

10. HASTINGSIA, Watson.

1. **H. alba,** Wats. Flowers in dense close raceme, 2-3 lines long. N. Cal., Or.

2. **H. bracteosa,** Wats. Flowers 3-6 lines long, nearly equaled by bracts: stamens short. Coll. by Thos. Howell in Curry Co., Or., May, 1884.

11. CHLOROGALUM, Kunth.

Perianth-segments very slender, ⅔-⅚ in. long: pedicels longer than the bracts 1
Perianth-segments oblong-oblanceolate, ¼-½ in. long: bulb-coats not fibrous 2, 3

1. **C. pomeridianum**, Kunth. Bulbs densely fibrous: leaves crispate-undulate, mostly radical: flowers white, purplish-veined. Cal. (*Soap-root.*)
2. **C. parviflorum**, Watson. Leaves grass-like: flowers pinkish. San Diego.
3. **C. angustifolium**, Kellogg. Leaves not undulate: white flowers. N. Cal.

12. ODONTOSTOMUM, Torrey.

1. **O. Hartwegi**, Torr. Numerous flowers 4-6 lines long. S. N. Foot-hills. Rare.

13. SMILACINA, Desfontaines.

1. **S. amplexicaulis**, Nutt. Panicle close: segments and filaments similar: fragrant.
2. **S. sessilifolia**, Nutt. Simple zigzag raceme few-flowered: berries blue-black.

14. MAIANTHEMUM, Weber.

1. **M. bifolium**, DC. **Var.** (?) Zigzag stem 3-12 in. high. S. F. Bay to Alaska.

15. YUCCA, Linnæus.

1. **Y. baccata**, Torr. Leaf-margins thread-bearing: perianth campanulate. S. Cal.
2. **Y. Whipplei**, Torr. Leaf-margins serrulate: perianth rotate spreading. S. Cal.

16. LILIUM, Linnæus.

Flowers horizontal to erect, spotless or finely dotted, white, purplish or pale yellow; segments tapering into long narrow claws, spreading.
  Flowers becoming purple or purplish: bulb-scales not jointed.............. 1, 2
  Flowers pale yellow, 3 in. long or more: bulb-scales jointed. 3
Flowers orange-yellow to red, spotted; segments oblanceolate to lanceolate.
  Flowers erect or horizontal, less than 2 in. long........................ 4, 5, 6
  Flowers nodding, segments revolute (*Tiger Lilies*)...................... 7, 8, 9

1. **L. Washingtonianum**, Kellogg. Bulbs becoming 6-8 in. long, the scales thin, lanceolate, 2-3 in. long; stems 2-5 ft. high: leaves in several whorls (some scattered), ⅜-1 in. broad, undulate: flowers white becoming purplish, often dotted, horizontal on erect pedicels; segments 3-4 in. long, ⅛-⅜ in. wide: yellow anthers 5-6 lines long.
2. **L. rubescens**, Watson. Similar: bulb smaller, thicker, broader scales an inch long: stems 1-7 ft. high: flowers nearly white to lilac, becoming rose-purple, 1½-2 in. long: anthers 2-3 lines long. Coast Mts., S. F. Bay to Klamath R.
3. **L. Parryi**, Wats. Stem 2-5 ft. high: leaves mostly scattered, slender. S. Cal.
4. **L. parvum**, Kell. Flowers few to many, erect or nearly so: anthers 1-2 lines long: capsule sub-spherical, ½-¾ in. long. S. N. Mts. 4–8,000 ft. alt., N. to Or.
5. **L. maritimum**, Kell. Flowers horizontal, deep reddish orange. S. F. to Hum'dt.
6. **L. Bolanderi**, Wats. Stems 1-2-flowered: leaves mostly in whorls, 1-2 in. long: flowers nearly horizontal, brownish or dull purple. Hum'dt to S. W. Or.

7. **L. pardalinum, Kell.** Rootstocks thick and branching, forming mat-like masses of bulbs: stems 3-7 ft. high: perianth segments 2-3 in. long, bright orange red with large purple spots below: anthers red, 4-5 lines long. Cent. Cal. to Or.

Var. angustifolium, Kell. Slender, small: leaves 3-4 lines broad, scattered.

8. **L. Humboldtii,** Róezl & Leichtlin. Bulbs 2-6 in. thick, often purplish, the fleshy ovate-lanceolate acute scales 2-3 in. long: stems purplish, 4-8 ft. high; leaves undulate in 4-6 whorls of 10-20 each: pedicels mostly 3-6 in. long: perianth-segments 3-4 in. long, ½-1 wide, papillose-ridged near base: anthers red, ⅛-⅜ in. long. Cal.

9. **L. Columbianum,** Hanson. Perianth-segments 1½-2 in. long: yellow anthers 2-3 lines long. Wash. to Cent. Cal.

17. FRITILLARIA, Linnæus.

Styles distinct above; stigmas linear: capsule obtusely angled.................. 1, 2, 3
capsule acutely angled or winged......... 4, 5, 6
Styles united: stigma 3-lobed: flowers not spotted: stamens unequal................ 7

1. **F. recurva,** Benth. Segments narrow, scarlet and yellow, spotted. Cal., Or.
2. **F. liliacea,** Lindl. Leaves near base: flowers greenish white. San Francisco Bay.
3. **F. biflora,** Lindl. Leaves near base: flowers dark brown, purple, green-tinged; segments widely spreading: mucronate anthers 2 lines long. Coast, San Diego to Mendocino.
4. **F. lanceolata,** Pursh. Bulbs with a few large scales and many like rice grains: leaves in 1-3 whorls: flowers dark purple mottled with greenish yellow; segments not spreading.

Var. floribunda, Benth. Flowers 1-8, lighter colored, blotched with brownish purple; segments acute, ⅛-½ in. broad, finely crenulate.

Var. gracilis, Wats. Flowers smaller with narrower acuminate segments.

5. **F. parviflora,** Torr. Flowers 3-20, with spreading segments ½-⅝ in. long, lighter colored than the last. Cent. S. N. Mts.
6. **F. atropurpurea,** Nutt. Capsule not winged, acutely 6-angled. S. N. Mts.
7. **F. pluriflora,** Torr. Stems leafy: flowers reddish purple, ⅝-1 in. long. Cent. Cal.

18. ERYTHRONIUM, Linnæus.

1. **E. grandiflorum,** Pursh. Leaves not mottled: flowers 1-6 or more, yellow, or cream color with darker center; segments recurved 1-2 in. long. Wash. to N. Cal.

Var. Smithii, Hook. Large flowers purple-tinged. Cent. Cal. Coast.

2. **E. Hartwegi,** Watson. Bulb ½-⅝ in. long: leaves mottled: flowers 1-3 on scape-like pedicels, light yellow and orange; segments scarcely recurved. S. N. Mts.
3. **E. purpurascens,** Watson. Leaves undulate: peduncle racemosely or subumbellately 4-8-flowered or more; pedicels very unequal: flowers light yellow, purple-tinged, orange center. S. N. Mts.

19. CALOCHORTUS, Pursh.

§ 1. Pedicels recurved in fruit: capsule broadly 3-winged.

Flowers on branching stems, nodding: concave petals closely connivent, hairy within, ciliate.. 1, 2

Flowers on rather weak stems, erect or nearly so: fruit nodding or not stiffly erect.

Flowers yellow, 6-8 lines long, densely hairy within.................................... 3

Flowers white to lilac or blue. Petals covered with hairs........................ 4 to 7

Petals hairy below only, or naked........... 8, 9, 10

§ 2. Flowers and fruit erect on stout pedicels: capsules not winged (except in 11 & 12): petals and sepals often with spots. (*Mariposas* or *Butterfly Tulips.*)

Flowers lilac or purplish, 1-1½ in. long: capsules 3-winged...................... 11, 12

Flowers yellow, more or less marked with brown or purple.................... 13 to 16

Flowers white or lilac.. 17 to 20

1. C. **albus**, Dougl. Petals white: sepals green, not spreading. Cal.

2. C. **pulchellus**, Dougl. Petals yellow or orange: sepals yellow or greenish, spreading. Coast Mts., Monterey to Mendocino.

3. C. **Benthami**, Baker. Slender, 3-6 in. high: leaves longer: anthers acute. S. N. Mts.

4. C. **Maweanus**, Leichtlin. Stem flexuose: petals covered above with white or blue-purple hairs, acute: anthers acuminate. N. Cent. Cal.

5. C. **cæruleus**, Wats. Very slender, 3-6 in. high: flowers 2-5 in an umbel: petals lilac dotted or lined with darker blue: anthers oblong, obtuse: capsule nearly orbicular. S. N. Mts.

6. C. **elegans**, Pursh. Similar: petals greenish white, scarcely ciliate: anthers long acuminate. **Var. nanus**, Wood, has acute more hairy petals, smaller. N. Cal. N.

7. C. **Tolmiei**, H. & A. Stouter, about a foot high: petals ¾-1¼ in. long, lilac-tinged: anthers lanceolate, acuminate. Mt. Shasta to Or.

8. C. **nudus**, Wats. Flowers 1-6, usually in an umbel, white or lilac: sepals about equaling the broadly fan-shaped hairless petals: anthers obtuse. Cent. S. N. Mts.

9. C. **lilacinus**, Kellogg. Leaves rather broad: flowers 3-10, on long zigzag pedicels: petals ½-1 in. long, pale lilac, slightly hairy below: anthers much shorter than the filaments, obtuse. S. F. Bay, Geysers.

10. C. **uniflorus**, H. & A. Similar: flowers 1 or 2: gland densely hairy. W. Cal.

11. C. **Greenei**, Wats. Stout, 1-2 ft. high: sepals with yellowish hairy spot: petals densely yellow-hairy below: anthers ½ in. long. N. Cal. to Or.

12. C. **Lyoni**, Wats. Sepals naked: anthers 1½-2 lines long. Los Angeles.

13. C. **clavatus**, Wats. Petals covered with club-shaped hairs at base: gland orbicular, deep: anthers purple, 4-5 lines long, obtuse. S. Cal. Coast.

14. C. **Weedii**, Wood. Stem zigzag: petals deep yellow, dotted, covered with slender hairs: gland small, densely hairy: anthers mostly acute. Cal. Coast.

Var. purpurascens, Wats. Petals purple or purple-blotched. St. Barbara.

15. C. **Obispoensis**, Lemmon. Sepals longer than the rotate or recurved, long-hairy, often bifid petals. San Luis Obispo.

16. C. **luteus**, Dougl. Petals 1-2 in. long, from yellow to deep orange, with more or less brownish purple inside: gland broad, rounded or somewhat crescent-shaped, densely hairy: anthers yellow, obtuse. Very variable. San Diego to Mendocino and S. N. Mts.

Var. oculatus, Wats. Petals white lilac or yellowish with a dark central spot: gland usually a narrow crescent.

Var. citrinus, Wats. Petals deep or lemon yellow with central spot.

17. C. **venustus**, Benth. Like the last: petals white or pale lilac above, with a reddish spot near the top, a brownish spot in the center bordered with yellow and a brownish base: gland large, oblong, hairy. Monte Diablo, S.

Var. purpurascens, Wats. Deep lilac or purple form. Kern Co.

18. C. **splendens**, Dougl. Like the preceding: petals clear lilac, paler in center, claw darker: anthers purple, ¼-½ in. long. Monterey, S.

19. C. **macrocarpus**, Dougl. Sepals about equaling the obovate acute or acuminate purple-lilac petals, 1½-2 in. long: anthers ⅓-½ in. long. N. Cal. N.

20. C. **Nuttallii**, T. & G. Slender: a single stem-leaf, or rarely 2 or 3: petals cuneate-obovate, usually white above, with a purplish band above the yellow base, sometimes deep lilac. S. N. Mts.

20. STREPTOPUS, Michaux.

1. S. **amplexifolius**, DC. Stem 2-3 ft. high: peduncles twisted beneath the deeply cordate clasping leaves, usually forked or kneed: perianth greenish white, ⅓-½ in. long, recurved above: anthers tapering into a single awn. N. Cal. N.

2. S. **roseus**, Michx. Smaller: flowers rose-purple: anthers 2-pointed. Or., N.

21. PROSARTES, D. Don.

Style slightly 3-cleft: fruit triangular, ½ in. long, bright salmon-color.................. 1
Style entire: fruit ovoid or obovoid: leaves mostly cordate and clasping.
  Filaments longer than the anthers.......... .... 2, 3, 4
  Filaments much shorter than the nearly sessile anthers....................... 5

1. P. **Menziesii**, Don. Perianth-segments ½-1 in. long, acute. S. F. Bay, N.

2. P. **Hookeri**, Torr. Stamens nearly equaling or a little exceeding the perianth, ⅓-½ in. long: ovary hairy: style exserted. Russian Riv. to Monterey.

3. P. **trachyandra**, Torr. Similar: stamens shorter: ovary smooth. S. N. Mts.

4. P. **Oregana**, Wats. Flowers often purplish-veined: stamens exserted. Or.

5. P. **parvifolia**, Wats. Woolly: leaves 1-1½ in. long. Siskiyou Mts.

22. CLINTONIA, Rafinesque

1. **C. uniflora**, Kunth. Nearly stemless: peduncle shorter than the leaves, 1-2-flowered: perianth white, ¾-1 in. long, pubescent. S. N. Mts. and Humboldt Bay, N.
2. **C. Andrewsiana**, Torr. Flowers rose-red in a globose umbel on a stout peduncle, often one or more smaller clusters below: fruit rich blue. In the redwoods.

23. SCOLIOPUS, Torrey.

1. **S. Bigelovii**, Torr. Perianth ½-¾ in. long: sepals lanceolate, spreading, striped: petals erect, very slender, dark: style branches 2-3 lines long. Redwoods.
2. **S. Halli**, Wats. Smaller: style-branches a line long. Cascade Mts.

24. TRILLIUM, Linnæus.

Flower sessile. Leaves sessile or nearly so, large.................................. 1
Leaves long-petioled: stem 3-4 in. high.......................... 2
Flower peduncled. Leaves sessile or nearly so, rhombic-ovate...................... 3
Leaves on petioles 1-15 lines long, lanceolate.................. 4

1. **T. sessile**, L., var. Californicum, Wats. Very variable: petals lurid-purple or rose-red to white, 1-4 in. long. San Diego to Or.
2. **T. petiolatum**, Pursh. Petioles exceeding or equaling the blade. Or. & Wash.
3. **T. ovatum**, Pursh. Flowers white becoming rose, fragrant. Santa Cruz, N.
4. **T. rivale**, Wats. Slender: leaves 1-2 in. long. N. W. Cal. & S. W. Or.

25. VERATRUM, Tournefort.

Perianth-segments entire or serrulate, oblanceolate, thickened on the sides at base.. 1, 2
Perianth-segments fringed rhombic-ovate, the riged base divided by a narrow furrow.. 3

1. **V. Californicum**, Durand. Stout, 3-7 ft. high: leaves 1-12 in. long, sheathing: panicle 1-2 ft. long: perianth-segments whitish with a greener brown-edged base.
2. **V. viride**, Ait. Flowers green in slender panicles. Oregon, N.
3. **V. fimbriatum**, Gr. Leaves lanceolate, 6-18 in. long, narrowed at base. Cal.

26. ZYGADENUS, Michaux.

Flowers all perfect; segments longer than the stamens, the outer ones not clawed..... 1
Flowers smaller: stamens equaling or exceeding the perianth, 2 or 3 lines long..... 2, 3

1. **Z. Fremonti**, Torr. From a few inches to 3 or 4 ft. high: raceme simple or compound: perianth rotate; segments ¼-⅜ in. long, rather obtuse. San Diego to Humb't.
2. **Z. venenosus**, Wats. Leaves rarely over 2 or 3 lines broad, usually folded: raceme simple or nearly so. Cent. Cal., N. (*Death Camass.*)
3. **Z. paniculatus**, Wats. Similar, stouter: raceme compound: lower flowers often sterile, short pediceled; segments 2 lines long, triangular, acute. Cal., E.

27. STENANTHIUM, Gray.

1. S. **occidentale,** Gr. Slender, 1-2 ft. high: perianth 4-7 lines long; segments linear-lanceolate, tips recurved: linear seeds winged. Or., N.

28. TOLFIELDIA, Hudson.

1. T. **occidentalis,** Wats. Viscid-pubescent: involucre 3-lobed often reddish.
2. T. **glutinosa,** Willd. Involucre scarcely lobed, near the flower. Or., N. & E.

29. NARTHECIUM, Moehring.

1. N. **Californicum,** Baker. Raceme loose, 3-5 in. long: perianth 3-4 lines long: capsule bright salmon-color; seeds with tails at both ends. N. Cal.

30. XEROPHYLLUM, Michaux.

1. X. **tenax,** Nutt. Stem 2-5 ft. high: perianth-segments ⅓-½ in. long. Cal., N.
2. X. **Douglasii,** Wats. Smaller in every way. Columbia River.

INDEX OF GENERIC AND COMMON NAMES.

*** The names of orders are in heavy-face type. Figures following names in parentheses denote the numbers of the species to which the common names apply; *e.g.*, *Baby-Eyes* is the common name of the third species of *Nemophila*. Figures next to the names refer to the Popular Flora.

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